630.5
AL
V.13

GOVERNMENT BOTANICAL GARDENS
LIBRARY.
Section.....
No.....

THE AGRICULTURAL LEDGER.

1906.

(BEING VOL. XIII.)

EDITED BY

THE REPORTER ON ECONOMIC PRODUCTS TO THE GOVERNMENT OF INDIA.

GOVERNMENT BOTANICAL GARDENS
LIBRARY.
Section.....
No.....

CALCUTTA:
OFFICE OF THE SUPERINTENDENT, GOVERNMENT PRINTING, INDIA
1907.

CONTENTS.

		Page.
1906, No. 1.—	Notes on Date Palm Cultivation in Countries other than India: by F. Fletcher . . .	1
„ „	2.—The Uses and Value of the Root of Costus speciosus as a Food Stuff: by David Hooper .	19
„ „	3.—Composition and Trade Forms of Indian Cutch: by David Hooper	23
„ „	4.—Goa Beans in India: by I. H. Burkill . .	51
„ „	5.—A Short Account of the Seeds and Oil of Cochlospermum Gossypium: by Surendra Nath Dey	65
„ „	6.—Materials used in making Bead Chains and Rosaries in India: by E. F. Vieux . . .	69
„ „	7.—Notes on Agave and Furcraea in India: by J. R. Drummond and D. Prain	77
„ „	8.—Index	273

NOTE.

To those who bind the *Agricultural Ledger* two alternatives are suggested: they may bind the issues of each year into an annual volume, or they may keep apart the Series into which it is divided.

These Series are as follows :—

I.—VEGETABLE PRODUCT SERIES.
II.—ANIMAL PRODUCT SERIES.
III.—MINERAL AND METALLIC SERIES.
IV.—AGRICULTURAL SERIES.
V.—INDUSTRIAL SERIES.
VI.—ENTOMOLOGICAL SERIES.
VII.—VETERINARY SERIES.
VIII.—FOREST SERIES.
IX.—MEDICAL AND CHEMICAL SERIES.
X.—IMPLEMENT AND MACHINERY SERIES.
XI.—CROP DISEASE AND PEST SERIES.
XII.—MISCELLANEOUS SERIES.

For either purpose indexes will be published. The annual index will continue to appear year by year; the "serial" indexes will appear at wider intervals.

The annual index refers to the numbering which heads the pages: the numbering at the foot, which is consecutive in each Series, will be used in the serial indexes.

Public libraries and similar institutions are likely to find the plan of binding in annual volumes the more convenient one.

I. HENRY BURKILL,

Officiating Reporter on Economic Products to the Government of India.

ERRATUM.

No. 5 (1906). Cochlospermum Gossypium—A Short Account of the Seeds and Oil: page 67, line 4, for Cook read Cooke.

(Vegetable Product Series, No. 93.)

THE AGRICULTURAL LEDGER.

1906—No. 1.

PHŒNIX DACTYLIFERA, *Linn.*

(THE DATE PALM.)

Notes on Date Palm cultivation in countries other than India.
By F. FLETCHER, M.A., B.Sc., *Deputy Director of Agriculture, Bombay.*

THE DATE PALM.

For the publication of the following article for Indian readers no apology seems called for in view of the many attempts that have been made in the country to improve and extend the very limited cultivation of the Date Palm. In almost every case these experiments have taken place along lines that indicated a lack of appreciation of the conditions under which the successful cultivation of this valuable fruit-tree has for thousands of years been carried out in countries other than India; they have in consequence met with uniform failure.

Scheme of this paper.

The present short article may therefore be conveniently divided into three parts thus:—

Part I.—A summary of the conditions necessary for the cultivation of the Date Palm with regard to (*a*) rainfall, (*b*) temperature, and (*c*) soil and of the methods of cultivation as practised in countries other than India.

Part II.—A brief account of the attempts that have been made in India to improve and extend its cultivation with the probable causes of the failure of these.

Part III.—A short description of the present aspect of its cultivation in India and suggestions for its extension and improvement.

DATE PALM CULTIVATION.

PART I.

CULTIVATION OF THE DATE PALM.

Description.

Description of the tree.—Like most palms, the tree has only a single bud, *viz.*, that at the top of its straight trunk. Usually if this bud is destroyed, the whole tree dies.

Phœnix sylvestris

Unlike its near relative and possible ancestor, the toddy palm of Bombay **(Phœnix sylvestris)** it produces when young numerous "offshoots" or "suckers" at the base of its stem. [a] The age of a date palm and most members of the family to which it belongs can be estimated only from its height and not as in ordinary trees by the size of, or number of rings, of annual growth contained in its trunk since the latter neither increases with age nor shows such rings.

Method of ascertaining the age.

Formation of leaves.

The leaves of the date palm like those of the toddy palm are of the fish-bone form and may reach a length of 18 feet. From 10 to 20 are produced each year and after remaining green for several years they become brown, hang down along the trunk and finally break off. Under cultivation the old leaves are cut off every year.

Sex of flowers.

The flowers of the date palm are of one sex only and not, as in most fruit trees, hermaphrodite. Moreover, the female flowers are not borne on the same tree as the male; in other words, we have male date palms and female date palms. Unless therefore in close proximity to a number of female trees there are growing an equal number of males, a large number of the female flowers will remain unfertilized since pollen can be naturally carried from a male to a female tree only by wind and insects and much is thus lost. Under cultivation however as we shall see later, the pollen is carried by man and a great economy brought about in the amount of pollen required to fertilize a given number of female flowers and consequently the proportion of male to female trees can be much lowered.

Distribution.

Distribution.

The date-palm is essentially a production of the warm dry zone that extends from Senegal to the Valley of the Indus and lies principally between 20° and 35° N. Latitude. It originated probably either in Northern Africa or Arabia and was first extensively cultivated by the Assyrians in the valleys of the Tigris and Euphrates. Thence its cultivation spread to Egypt and Arabia. The Arabs carried it into Morocco whence the Moors transported it to Spain; thence it was introduced by missionaries into Mexico soon after the conquest of that country.

The Date Palm in Mexico.

[a] These abnormally may arise higher up the trunk and sometimes the latter is covered with them for 20 feet along its length.

DATE PALM CULTIVATION.

Experiments in the cultivation of the date palm are now proceeding in the south-western members of the United States, in Queensland and West Australia, and in Trinidad (West Indies).

United States, Australia, West Indies.

No reliable estimate can be made of the number of date palms in existence, but the following table may be taken as giving the approximate relative importance of the various centres :—

TABLE I.—*Approximate number of trees in date-growing centres exclusive of India.*

Date Palm trees in existence (exclusive of India).

Country.	Centre.	Approximate number of tree in millions.	REMARKS.
Morocco	...	(not known)	
Algeria	...	4	The Biskra and Wadi Rhir tracts each contain 50,000 trees.
Tunis	...	2	
Tripoli	...	4 to 5	
Egypt	Upper	6¾	In addition the oases of Siwa, Dakhla and Khargah contain respectively 300,000 trees, 50,000 and 65,000.
	Lower	3¼	
Arabia	Bahrein Island	½	
	Elhassa	2	
	Katif	1¼	
	Muscat	½	
Mesopotamia	Bussorah	5 to 6	
	Bagdad	1	
	Minab	5 to 6	
Persia	Tangistan	¼	
Baluchistan	Pangh Ghur	½	

Note.—There are many centres in Persia, Arabia and Baluchistan for which even approximate figures are not on record.

The numbers in America are insignificant at present, Lower California (Mexico) having about 5,000 trees.

Climatic conditions necessary.

Climatic conditions necessary.

It is not, however, in every portion of the sub-tropical zone comprised between the parallels of 20° and 35°, that the date-palm will ripen fruit. This occurs only where the summer is both hot and dry and the winter not too cold. Thus in the West Indies and Florida the humidity of the air is too great for fruit to ripen though the tree grows well ; in North-West Mexico again sea breezes keep the air too moist and cool, while in the valleys of Lower California large quantities of dates are grown.

DATE PALM CULTIVATION.

On the other hand fruit may ripen north of this zone, *e.g.*, at Elche in Spain where is found the only grove in that country that survives as a commercial enterprise.

The requirements of the date palm with regard to (*a*) atmospheric humidity and rainfall and (*b*) sunshine and temperature are illustrated by the following data at stations where dates are grown.

Humidity and Rainfall.

Humidity and Rainfall.

The low relative humidity and rainfall in all typical date-growing regions is very marked and the lower these factors are the better is the quality of the dates grown.

Excessive humidity probably acts indirectly by tempering the heat of the sun, while rain at the time of flowering spoils the pollen and during the ripening season causes fermentation in the fruit.

The general time of flowering in almost all regions of the date belt is March to May and that of ripening August to November. More than half the total yearly rainfall at the localities mentioned in the table below occurs between November and March, that is before the flowering period commences.

TABLE II.—*Humidity and Rainfall.*

Locality.	Mean relative Humidity during flowering and fruiting season, April 1st to September 30th.	Average rainfall in inches.	Remarks as to quality of dates.
Biskra, Algeria . .	30 per cent.	9·46	Dates are not of best quality.
Ayata, Algeria . .	...	4·89	Dates are of the best possible quality and include the famous Deglet Noor.
Phœnix, Arizona .	33 „	7·08	Dates of early varieties only ripen.
Alexandria, Lower Egypt.	60 „	8·00	Dates are not of best quality.
Cairo, Eygpt . .	58 „	1·08	Dates are of better quality than at Alexandria.
Berber, Upper Egypt	22 „	...	
Bagdad, Persia .	...	4·8	Dates are of the best quality.

Summing up then the conditions under which the date palm can ripen fruit, we may say that the rainfall during the flowering

DATE PALM CULTIVATION.

and fruiting period should not much exceed 5 inches. It must not however be concluded from this that the palm will grow if this amount of rain is the only source from which its roots can obtain moisture during the period or, during the year, say twice this amount, *i.e.*, 10 inches. For instance the annual rainfall at Cairo is about 1 inch, and this is insufficient to support any kind of vegetation; date palms however grow and ripen fruit there well. This result is only attained by irrigation.

Irrigation.

Irrigation is an absolutely essential accompaniment to the cultivation of the date palm. For if the rainfall is sufficient to allow of the growth of the tree with this as its only source of water, it will be too great to allow the flowers to be pollinated well and the fruit to ripen.

These unique requirements of date culture with regard to water lie at the root of all the failures to extend its cultivation in India as will be pointed out later (Part II). They are in accord with the peculiar origin of the palm which is supposed to have arisen in the ravines of the Libyan or Arabian deserts that are inundated at long intervals by rain water from large catchment areas. The seed of the palm will germinate only in very moist soil and the moisture sufficient for the growth of prickly pear and other xerophytic plants is quite insufficient.

Germination of seed.

It should further be noted that the term irrigation is used here in a wide sense to include sub-irrigation (natural or artificial) as well as the ordinary superficial type. Thus when palms have once attained a full growth they will grow on the banks of irrigation canals and of rivers provided the water surface is not more than 20 feet below even if the region is quite rainless. They will not however yield heavily under these conditions without the help of irrigation.

Soil required for trees.

A further distinction between the requirements of the young and of the adult plants will be found later with regard to the quantity of soluble salts contained in the soil, the former requiring sweet lands while the adult plants will withstand "alkali" to an extent quite unusual among cultivated plants.

Sunshine and Temperature.

Temperature.

The requirements of the date palm in regard to temperature are very peculiar as, when in a dormant condition, it is not injured by temperatures as low as 20°F., while no upward limit to its endurance has been found. Indeed extremely high temperature is absolutely necessary to enable it to ripen its fruit and neither flowers nor fruits are formed unless the mean temperature rises above 64·5°F.

Fruiting season.

If the mean temperature for the fruiting season (May to October) is above 70°F. and for one month at least above 80° F., early varieties of dates will ripen fruit, but for the moderately late varieties these temperatures must be above 75° F. and 85° F. respectively and for best and latest 84° F. and 94°F.

DATE PALM CULTIVATION.

These facts may be illustrated by the data given in the tabular statement following:—

TABLE III.—*Temperature.*

Sun necessary for growth of tree.

Locality.	Mean temperature, May to October.	Mean temperature of hottest month.	REMARKS.
Algiers, Algeria	71·0	below 80	No dates ripen.
Biskra, Algeria	81·5	92·0	Dates of very good quality ripen.
Ayata, Algeria	83·8	above 94	Deglet Noor ripens well only if mean temperature (May to October) is above the temperature given.
Tongourt, Algeria	85·0	Ditto	Deglet Noor always ripens.
Phœnix, Arizona	80·1	Ditto	Dates of early varieties only ripen.
Alexandria, Egypt	76·8	80·5	Ditto.
Cairo, Egypt	79·5	83 5	
Berber, Upper Egypt	91·2	93·6	Dates of very good and late varieties ripen.
Bagdad, Persia	86·8	94·2	

Further not only are these temperatures in the shade necessary, but the tree must be exposed to the direct rays of the sun and will not grow under shade even when young.

Soil.

Soil.

The physical character of the soil, whether sand, loam or heavy clay, appears to have little influence on the growth and productiveness of the date palm; except perhaps that on light loam and sandy soils it comes earlier to maturity and flowers and fruits earlier in the season than on heavy soils. With few exceptions, of which Biskra is one, the soils of the Saharan oases are of a sandy nature. On the other hand the majority of the soils of the Mesopotamian tract consist, like most of those of Egypt, of one of the densest clays known. Some however of the date groves in Egypt, especially those of the coast region, are situated on almost pure sand. On the whole sandy loams may be said to be best suited to the cultivation of dates.

Sandy loam best suited.

This range in the physical characters of soil suitable to date cultivation is equalled only by the indifference of the palm to the quantity of "Alkali" (soluble salts) in the soil. The investigations of the United States Department of Agriculture,* on the soils of the

* SWINGLE—The date palm and its utilization in the South-Western States. Bulletin 54, Bureau of Plant Industry, United States Department of Agriculture, 1904. To this publication the present writer is also indebted for most of the meteorological data here given.

DATE PALM CULTIVATION.

Alkali soil—growth in.

Algerian palm-bearing tracts show that there "although this plant can grow in soils containing from 3 to 4 per cent. of their weight of alkali it does not produce fruit unless its roots reach a stratum of soil where the alkali content is below 1 per cent., and does not yield regular and abundant crops unless there are layers in the soil with less than 0·6 per cent. of alkali." The alkali here referred to is "white alkali" which consists of chlorides and sulphates of sodium, and magnesium, "black alkali" (carbonates of these elements) not being recorded in any quantity from date-growing centres. In the Saharan soils most of the alkali is in form of sulphates which are much less injurious than chlorides; these soils further contain large quantities of gypsum, and this not only prevents the formation of "black alkali" but doubtless also counteracts the very poisonous magnesium salts of "white alkali" which in some cases are present in considerable quantity.

Less than 0·6 per cent. alkali required. White alkali. Black alkali.

Method of cultivation of the Date-Palm.

Method of cultivation.

Having thus briefly reviewed the requirements of the palm with regard to climate in the chief centres of its cultivation, we will now sketch the details of cultivation. As they vary only in minor particulars in the several centres a general account will suffice.

Propagation.

Propagation.

The date palm may be propagated in two ways, *viz.*, (*a*) by means of seed, and (*b*) by means of "offshoots."

Proportion of male and female seedlings.

Of these methods the latter is the only rational one for the reasons that, if seeds are sown, about half the seedlings are males and of course yield no fruit, while female seedlings seldom produce fruit of as good quality as the tree from which the seeds were obtained.

One male tree sufficient for fertilization of 100 females.

Now one male tree will, under cultivation, suffice for the fertilization of about 100 females, so that if 98 per cent. of the male seedlings are not destroyed, about half the area of the plantation is occupied by useless trees. This removal of the superfluous males cannot take place until about six years at the earliest after sowing since at that age flowers are first produced. In consequence for six years at least half the plantation consists of trees from which no revenue can ever be obtained.

When to remove male trees.

Effect of artificial pollination.

The reason why seedling female palms do not produce fruit of the same quality as their female parent is that the latter is in general pollinated (artificially) from a male of an inferior variety and although, except in the case of maize and a few other plants, cross-fertilization of this kind has no effect on the quality of the resulting fruit, it will of course influence the offspring. Probably therefore out of 100 seedlings from a good female parent only about 6 would produce fruit of good quality.

Six per cent. of good fruit.

DATE PALM CULTIVATION.

Propagation from seed.

Propagation from seed.

A short account of the method of rearing seedlings is however here given.

Soil for seed bed.

The seeds should be sown in a seed bed that has been specially prepared on sweet soil by ploughing in a mixture of ordinary farmyard manure and an oil-cake at the rate of about 10 tons of the former and 400 lbs. of the latter per acre. Suitable oil-cakes for India are those obtained from the castor oil plant (**Ricinus communis**), "Jambho" (**Eruca sativa**) or any of the mustard family; these cakes have the property of more or less preventing the attacks of white ants.

Quantity of manure required.

Oil-cakes recommended.

Alkali soil injurious.

Emphasis is laid on the fact that the soil of the seed-bed should be sweet and not impregnated with alkali salts (reh or usar lands), since though offshoots and adult plants will tolerate large amounts of such salts, a very small percentage of these in the soil will suffice to kill the seedlings soon after germination if not actually to prevent germination of the seeds.

When to irrigate.

After this preparation, the seed-bed should be irrigated in March or April and two or three days later the seeds sown in it at a depth of 1 or 2 inches in rows 3 feet apart with intervals of 3 feet between seeds in the rows.

The bed should then be watered every second day or so for the first three or four months and after that every week for a second period of similar duration; thenceforward the palms should be irrigated every month in the hot weather and every two months in the cold weather.

When to transplant seedlings.

The seedlings may be transplanted from April to September after reaching the age of three years. Preferably they should be left in the seed-bed until they flower. This in good soil may occur six to ten years after sowing—the shorter period being sufficient in a locality where the average temperature is high. When the flowers appear and then only—the sex of the seedlings can be determined with certainty; the superfluous males may therefore now be weeded out and abandoned.

Process of transplantation.

During the process of transplantation the largest leaves of the seedlings should be cut off at a distance of about 2 feet from their bases. Other details of transplantation are as in the case of offshoots.

Special attention is called to the fact that though the adult palm requires water of irrigation only at long intervals or not at all if the subsoil is kept constantly moist by natural sub-irrigation, the seed will not germinate or the seedling survive unless water is present in abundance.

Abundant water necessary for germination.

Propagation by offshoots.

Propagation by means of Offshoots.

This, as was stated above, is the only rational method of propagation since it is thus only that palms true both in sex and in quality

DATE PALM CULTIVATION.

of fruit to the type of the parent can be secured. We can by this method plant 100 female trees on the quality of the fruit of which we can rely and the one male necessary to fertilize these, without wasting time and land in cultivating superfluous male trees and female trees which later prove to bear fruit of an inferior quality.

Offshoots from male or female trees.

The offshoots are suckers borne at the base of the stem of trees between the limiting ages of about 6 and 16 years. Trees younger than six years of age and older than 16 do not as a rule bear offshoots. Offshoots cut from a male tree will give rise to male trees, and from female trees, females; in the latter case the fruit will be of the same quality as that of the parent palm.

When to remove offshoots.

Offshoots are removed from their parent when from 3 to 6 years of age. They then weigh about 6 lbs. The operation of removal is performed with an ordinary hatchet by cutting down parallel to the parent stem. The large leaves are then cut away as in the case of seedlings leaving only the rootless stump of the offshoot with its bud protected by leaf stalks and young leaves.

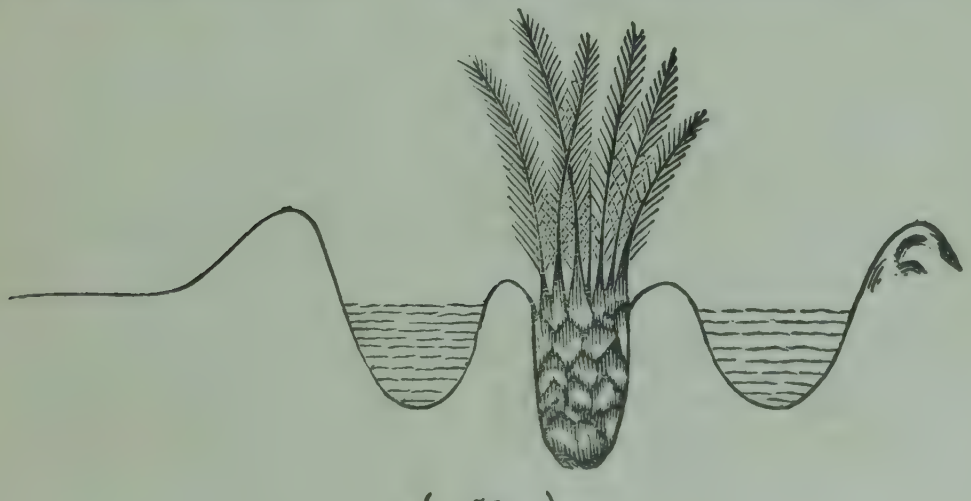
How to transport offshoots.

Such offshoots can be packed for transport in boxes with a little palm fibre or straw and planted any time within three months of their removal from the parent.

When to plant and

The time at which the offshoots are removed from their parents or planted out is not very material so long as the weather is not too cold. For India April to September is probably a safe period, April being possibly the best time. The offshoots should be planted in rows 25 feet apart with similar intervals, between plants in the row. For this purpose holes 3 feet deep and the same distance in diameter are made in the soil; half of the excavated earth is mixed with its own volume of farmyard manure with 4 or 5 lbs. of oil-cake and filled in, the offshoot being set in the centre of this hole. In doing this it is most important that the bud in the centre of the leafstalks and young leaves should not be choked by being covered with soil. For this reason the offshoot should be planted with the bud two or three inches above the general level of the ground and a circular trench a foot in width be dug round it for purposes of irrigation. This is shown diagrammatically thus:

How to plant offshoots.



DATE PALM CULTIVATION.

When and how often to water offshoots.

The offshoots should be watered every day for the first month, twice a week for the second month and thenceforward every month for at least a year.

During the first year after planting out, the offshoots should be protected from November to March by wrapping them loosely in straw or matting.

Proportion of sexes.

Proportion of the Sexes in a Plantation.

In general it is impossible to distinguish with certainty between male and female palms until the flowers appear. With experience however the sexes can be distinguished by the following points :—

How to distinguish them.

(*a*) the segments of the leaves of the male are somewhat stouter than is the case in the females and their sharp points in consequence are more penetrating ;

(*b*) the stems of adult males are thicker than those of females ;

(*c*) the crown of leaves in the case of a male tree consists of more leaves than in the case of a female.

Safe method.

These distinctions will only apply to the sexes when both are growing under the same conditions in the same locality. The only safe method of differentiation in the case of seedlings is therefore by means of the flowers. It is necessary then to wait until the palms flower before the weeding out of superfluous males becomes possible.

In the case of offshoots no such difficulty arises. It is shown below that even with the most careless method of artificial pollination the pollen from one male palm is sufficient to pollinate 50 females. This however will be the case only if the trees (both male and female) flower at about the same time. It is safer to have three male palms to every 100 females in the plantation.

3 per cent. male trees in plantation desirable.

Attention required by the adult trees.

After the offshoot (or seedling) has been planted out in its final situation, its chief requirements are (1) irrigation and (2) pollination

Irrigation.

Irrigation.

This has already been mentioned above where it was stated that it is required about once a month in general ; if however the water table is not more than about 20 feet below the surface, practically no artificial irrigation will be necessary for adult plants ; on the other hand in the oases of Algeria where the water level may be several hundred feet below ground level an average of twice a month is necessary. No general rule can therefore be given with regard to the amount of water to be applied artificially to the date palm. This will depend on the depth of the water-table, amount of rainfall, character of soil, climatic conditions, etc.

When artificial irrigation is needed for adult trees.

DATE PALM CULTIVATION.

How often to gate.

Further the palm requires more water during certain seasons of the year than during others. Thus if 12 waterings are given during the year, nine of these should be given at regular intervals between the months of May and September inclusive and one each in November, January and February. If 24 waterings per annum are necessary, they should be apportioned between the several seasons, in a similar ratio, weekly waterings being in this case given from May to September.

At flowering time no water needed.

In general terms it may be said that at the time of flowering (February-March) little or no water should be applied as an excess prevents the proper setting of the fruit. From May until the fruit ripens (September) water should be liberally given.

The amount of water to be given to each date palm in the form of irrigation will also vary generally according to the method in which it is applied. In sweet soil the best and most economical method is to dig a circular trench about $2\frac{1}{2}$ feet deep and of the same breadth, round each palm at a distance from it of about a yard. At each irrigation this trench is filled with water from a water channel and the in-take is then closed. In this way each palm receives about 800 gallons of water at every watering.

Method of watering.

Another method of watering is to enclose each tree in a bed by making a ridge about a foot high at a distance away from the tree of about 6 feet, the land in this case being divided up just as for ordinary crops under irrigation. The crops mentioned above can then be sown in these beds and will ensure less waste of water. This method should be used in the case of alkali soils since thus the injurious salts may be washed down into the sub-soil; after each application of water the beds should, if possible, be lightly hoed over to prevent evaporation.

Flooding not injurious to trees, but undesirable for young offshoots.

It may here be noted that the date palm may have the base of its stem flooded for considerable periods without being damaged. In the "basins" of Upper Egypt, for example, water to a depth of 3 or 4 feet stands round the bases of the stems for a couple of months every year. During the rest of the year the only source of water that the palm can draw on is the natural sub-soil supply. Flooding will however destroy newly planted offshoots by choking their terminal bud.

Duty of water for date palms.

Quantity of water necessary.

In a plantation with trees set at 25 feet apart, an acre contains 70 trees. Under conditions similar to those of the Algerian oases where the largest number of irrigations per year (24) are required to be applied artificially, the quantity of water necessary per acre per annum is approximately $800 \times 70 \times 24$ gallons $= 216{,}000$ cubic feet. Of this quantity three-fourths is used in the period from May to September, that is, at the rate of $\frac{216{,}000 \times \frac{3}{4}}{5}$ cubic feet per month $= \frac{216{,}000 \times \frac{3}{4}}{5 \times 30 \times 24 \times 60 \times 60}$ = cubic feet per second $= \frac{1}{80}$ cubit feet per second.

DATE PALM CULTIVATION.

Trees per acre to water-supply.

Thus in a rainless tract with a very low water-table, the duty per cusec* is 80 at the time when water is required in largest quantities. We should not therefore under these conditions plant more than 80 acres with date palms for every cubic foot per second, of the available water-supply. In autumn and winter this water-supply will be more than enough for the palms and winter crops may therefore be grown under them.

From this minimum the duty of irrigation water may rise indefinitely under other conditions and reaches infinity in the rare cases where a sufficient supply can be obtained from the natural sub-soil reserve.

If the site of the plantation is not naturally well drained, artificial open drains 4 to 6 feet deep should be dug between each row of palms, care being taken that the outflow from these drains is kept free.

Auxiliary crops. General practice in date-growing districts.

What to cultivate.

It is the general practice in the best date-growing localities to grow a variety of crops under and between the palms. While the trees are small only such crops are cultivated as will not cause injury by shading ; instances of these crops are wheat, barley, lucerne, clover, etc. Later, in the shade cast by the palms, figs, grapes, pomegranates, apricot, peaches, and similar fruits will flourish without detriment to the production of dates. In cases where this practice of inter-cultivation is followed, the palms share in the benefits resulting from the application of manures and irrigation to the subordinate crops, and require no special and separate cultivation. Where such inter-cultivation is not in vogue the ground round the palms should be dug up every two or three years and farmyard manure applied. Weeds should be kept down by three or four light ploughings per annum. In addition to irrigation another point requiring attention is that old leaves from the crown and offshoots from the base of the stems should be removed, the former every year as they die and the latter whenever necessary. A palm should not be allowed to have more than four offshoots growing from its base, as otherwise the main trunk suffers. On the other hand it should not be entirely deprived of offshoots so that if it dies its place may be taken by one of them and the variety perpetuated. Moreover, after an offshoot has been planted its secondary offshoots should not be removed until a year has elapsed as it is protected by the latter and their removal would cause mechanical injury to the yet tender plant.

More than four offshoots injurious to tree.

Pollination.

Pollination.

Age at which trees flower.

The age at which palms commence to flower varies with the character of the climate and soil and with the amount of water applied to them. In Arizona and Sind this age is in some cases

* This means that a constant stream of water supplying 1 cubic foot per second will irrigate 80 acres.

DATE PALM FERTILISATION.

as low as four years in the case of seedlings; the amount of fruit then produced is, however, small. Eight years from the date of sowing may in general be stated to be the age at which appreciable quantities of fruit are produced. Offshoots, since they are planted out when three or four years old, will bear four or five years after being detached from the parent stem. Trees are in *full* bearing 10 or 11 years after the sowing of the seed in the case of seedlings or in the case of offshoots, after their appearance on the parent stem. They will continue bearing for 100 years or more if well cared for.

Age of tree in full bearing.

Trees 100 years old.

Male inflorescence.

The male inflorescence consists of a stout stalk bearing a large number of slender branches (4 to 6 inches long) to which are attached the innumerable white flowers. The whole inflorescence is enclosed in a sheath which is at first quite closed but later splits into two parts between which the inflorescence protrudes. The inflorescence with its enclosing sheath is cut from the tree generally immediately before but sometimes immediately after the splitting of the sheath; this occurs when the sheath has become covered with brownish spots, its general colour, in consequence, turning from green to brown and its texture becoming soft. One or two of the slender branches bear sufficient pollen for the fertilization of a whole female inflorescence and as a male inflorescence consists of over 100 such branches, one of them suffices to pollinate about 50 or 100 female inflorescences according as one or two branches are used for each. As the number of inflorescences is on the average about the same on trees of both sexes (5 to 30) one male tree will suffice to pollinate 50 or 100 females as the case may be.

Female inflorescence.

The female inflorescences are borne like the male within sheaths which are enclosed at first and finally split as the inflorescence grows. The latter consists as in the case of the male of a stalk bearing a large number of branches to which the minute flowers are attached.

Process of pollination.

The process of pollination is performed as follows:—

As soon as the female inflorescence is visible between the separating parts of the sheath, one or two branches of the male inflorescence (previously removed from its tree) are inserted among its branches. In most cases the Arabs insert only one branch of the male inflorescence and then loosely bind together the enclosing branches of the female inflorescence with a thin strip of a palm leaf or string. As the fruit developes the stalks bearing it break the tie. In Sind on the contrary two small branches are usually inserted transversely among the female branches and no tie is used.

Flowering period.

The flowering period of the date palm varies with the variety and also with the climate of the locality in which it is grown and may be as early as January and as late as June, but March-April may be taken as the period in which in general the majority of the flowers are pollinated. For example, in Algeria flowering commences in April,

DATE PALM FERTILISATION.

in Egypt and Persian Gulf region in March. Even on the same tree the inflorescences may differ in age by a month.

Male inflorescence will keep for twelve months.

The male inflorescence may be kept for at least one year with safety if it is not removed from the sheath or is removed from this and placed in a paper bag and stored in a dry place. This procedure is advisible in case some of the female trees should in the following season flower before any of the males have provided pollen.

About three months after pollination two of the three young fruits produced by each of the fertilized flowers fall off and a single date alone is thus left to ripen from each flower. If a flower has not been pollinated all these dates will remain attached to the stalk but they are seedless and without value; they are the only so-called "seedless dates" in existence and are of course not a distinct variety.

Seedless dates.

At this time also, that is, in the beginning of June, some of the clusters of fruit should be removed from the tree so as to increase the supply of material to the remainder. Usually not more than 10 or 12 clusters are allowed to remain and eight may be taken as the average. Care should be taken to remove the poorest branches, and those that, not having been pollinated, show the phenomenon described in the last paragraph.

Weight of bunch of fruit.

The ripe dates constituting the bunch developed from a single inflorescence will weigh from 10 to 40 lbs. The average yield may be taken as 120 lbs. per tree for all varieties and localities; some varieties yield as little as 50 lbs. and others as much as 500.

Average yield.

All the dates on a bunch do not ripen simultaneously. If the variety is a very valuable one, the dates are picked singly as they ripen, but usually the bunch is cut off bodily when 50 per cent. of the dates are ripe and is hung in a dry shady place until the remainder ripen. Before being thus hung up, it is necessary to remove from the bunch any spoiled dates, otherwise the whole bunch will become tainted.

Period when fruits ripen.

The period of ripening varies from June to October according to the variety and locality. The months in which the principal varieties ripen their fruit is given below in Table IV for their own localities; if transported to another region a variety may change its time of ripening. August is considered late in the hot climate of the Muscat hinterland but early in the cooler climates of Bagdad and Egypt where the majority of varieties ripen in September and October.

Varieties,

Varieties of dates.

It would be foreign to the purpose of this article, even if the information were on record, to give a full list of all the known varieties of dates. These number some thousands in all. It will

suffice to state that all varieties may be classed as belonging to three types. These are :— VARIETIES OF DATES.

Class I.—"Soft dates."—These are the kind found in the European and American markets. The percentage of sugar they contain is so high (60 per cent.) as to preserve or candy them naturally; it is in some cases necessary to allow some of the syrup to drain off before packing, *e.g.*, the Ghars variety. Soft dates.

Class II.—"Medium dates."—These also are soft but do not contain enough sugar to preserve them naturally. As they do not dry readily, they are generally eaten fresh from the tree (Ar. "rattab"). Medium dates.

Class III.—"Dry dates."—This class are hard and not sticky even when ripe and may be allowed to dry on the tree. They can be stored without special precautions and are in consequence much esteemed in date-growing tracts for local consumption though not so sweet as the preceding classes. Dry dates.

Of all varieties, the best are the Tafilet, Deglet Noor, Monakhir, Khalasi, Mozati and Helwi between which there is little to choose, each having some special point of excellence in texture or flavour. Other well-known varieties also are given below :—

TABLE IV.—*Some well-known Varieties of Dates.*

Type.	Country.	Centre.	Name of variety.	Dates of ripening.	Soil required.	Market.	Remarks on character of fruit.
Class I	Morocco	Tafilet, Oases	Tafilet	October	Sandy	England	Darker than the Deglet Noor.
	Algeria	Tougourt	Deglet Noor	„	„	America & England.	Medium size and dark brown.
		M'zab	Teddala	September	„	Local	Long and yellow.
		Biskra	Ghars	„	Clay	„	
	Tunis		Monakhir	October (end)	Sandy	„	Said to be superior even to the Deglet Noor.
	Egypt	Seewah Oases	Wahi or Sewi.	August	„	Fayum (Egypt)	Plump and yellow.
		Lower Sharkiah	Amri	September	Clay	Europe	Large and black.
		Lower Gizeh	Amhat	„	Sandy	Local	„
	Arabia	El Hassa	Khalasi	August	„	„	Medium size and golden brown.
		Muscat (Semail valley).	Fard	„	„	America	Medium size and dark brown.
			Berhi	September	Heavy clay	Local	Medium size and golden brown.
			Hevesi	„	„	„	Medium size and gold brown; better even than Helwi.
		Bussorah	Helwi	„	„	America and Europe.	Medium size and dark brown; very superior quality.
			Khadrawi	„	„	„	Like Helwi, but darker and not so good.
	Mesopotamia		Sayer	„	Sandy	America	Medium size and dark brown, not very good quality.
			Maktum	August	Heavy clay	Local	Medium size and golden brown.

		Bagdad	Kustawi	„	„	„	Like Maktum, but not so good.
			Taberzal	September (end)	„	„	Small and dark brown; very good quality.
	Persia	Minab	Murdasing				
	Baluchistan	Pangh Gurh	Mozati		Sandy	„ *	Medium size and dark brown; excellent quality.
	Egypt	Upper Bedrashen	Amhat	August	Sandy	Local	Medium size and yellowish brown.
		Lower Rosetta	Rachidi or Samani	September	„	South Europe †	Large and yellow.
		Lower Marg	Hayani	July	Clay	Local	Red and coarse.
		Lower Alexandria	Ramli	September	Sandy	„	Long and black.
Class II			Nagal	June	„	„	Small and light coloured.
	Arabia	Muscat	Mubsali	August	„	India †	Large and light coloured.
			Khassab	„	„	Local	Medium size and red.
	Mesopotamia	Bagdad	Burni	„	Heavy	India† and Local	Small and light coloured.
	Egypt	Upper Oases	Sultani	September	Sandy	Egypt	Short and brown.
		Upper Berber	Ibrimi	„	„	„	Long and brown.
Class III			Gondaila	„	„	„	Large and yellowish brown.
	Mesopotamia	Bagdad	Bedraihe	„	Heavy clay	Local	Small and yellowish.
			Zehedi	„ (end)	„		ditto.

* Also packed in jars in date syrup or honey and sold in Karachi.
† Boiled while still unripe and then called in Arabic "Kharak pokhta" and in India "Kharak."

G. I. C. P. O.—No. 642 R. E. P.—19-7-06—00.—J. A. C. W

(Vegetable Product Series, No. 94.)

THE

AGRICULTURAL LEDGER.

1906—No. 2.

COSTUS SPECIOSUS.

[*Dictionary of Economic Products, Vol. II.*, C. 579-581.]

The uses and value of the root of **Costus speciosus** *as a food stuff.*

By DAVID HOOPER, F.I.C., F.C.S.

Costus speciosus, *Smith; Hooker fil., Flora of British India, VI., (1892), page 249; Watt, Dictionary of Economic Products, II., (1889), pages 579-581, paragraphs C, 2013-2018; Dymock, Warden and Hooper, Pharmacographia Indica, III. (1893), page 427.*

Syn.—COSTUS ANGUSTIFOLIUS, *Ker-Gawl;* C. ARABICUS, *Linn.;* C. ARGYROPHYLLUS, *Wall.;* C. SERICEUS, *Bl.*

Vern.—*Gód, chirayagód, bilaya kand,* SASARAM; *Kewa,* PALAMAU; *Kia kandia,* PURI; *Orop,* SANTALI; *Keu,* BENGALI; *Keoli, kyóla, koot,* U. P., *Kes-kand, keoo kanda,* RAIPUR; *Kai kanda,* SAMBALPUR; *Baesie godda,* CHANDA, C. P.; *Bomma kachika,* TELEGU; *Penva,* MAR; *Jangli haldi,* BHOPAWAR; *Tebu,* SINGHALESE; *Pa-lan-toung-Wae,* BURMESE; *Kemuka,* SANSKRIT; *Tawe-tawe autar, setawa, satawa,* MALAY. **Vernacular.**

This plant is the *Tjana-kua* of Rheede and the *Herba spiralis hirsuta* of Rumphius.

Habitat.—Common throughout India in moist shady places, as in forests, and near water. The plant has large white flowers with red calices and glossy leaves. **Habitat.**

The plant is wild and sometimes cultivated. It is easily propagated by sub-division of the roots. The plant flourishes in the rains, flowering in the month of August and September and fruiting in December. The leaves remain till January, but the plant dies away in the hot weather. The plant has the appearance of ginger, and the rhizomes resemble commercial samples of ginger in their growth, structure, size and colour. They, however, possess no aromatic properties, and the taste is mucilaginous and feebly astringent. It could only be used as a substitute for ginger by being preserved with a quantity of that root sufficient to flavour it.

Food.—The roots of this plant have long been considered wholesome and nutritious, and during an enquiry into the famine foods of

COSTUS SPECIOSUS. Food.

India conducted by the Reporter on Economic Products the root has been supplied by officers in Bengal, United and Central Provinces and in Central India, as a staple food among the poorer classes.

Before it is eaten the root is boiled like potatoes; in Raipur, Central Provinces, the root is first broken up into a pulp and boiled and eaten as gruel. Whether eaten by itself or mixed with other roots or grains it is considered a good vegetable. The root is cooked in syrup and made into a preserve in some parts of India.

Medicine.

Medicine.—In addition to its alimentary uses the root of **Costus** is employed for medicinal purposes. Dr. Irvine in the "*Materia Medica of Patna*" says, the root is given in mixtures in doses of 40 to 120 grains. "The root is sold in the bazars at two annas=2*d*. per pound." In Naini Tal the root is said to be good in cold and rheumatism. In Central India the root is powdered, mixed with crude sugar, and taken by patients suffering from pneumonia; it is also considered a tonic. Stewart remarks that the root is given as a depurative and aphrodisiac in the Panjáb. It is used by Santál ojhas for "pain in the marrow." It appears that wherever the plant grows the root is supposed to be efficaceous in diseases, and Ridley points out that it is used in medicine in Malaya (*Journal of the Royal Asiatic Society*, Straits Branch, No. 30, 1897, page 247) under the names of *Setawa*, *Satawa*, *Tawa-tawa* and *Tawagas*.

Analysis.

Chemical Examination.—Fresh roots collected near Calcutta in the month of November were cleaned and dried. In a fresh condition the roots were nearly white; the average weight of twenty specimens was 220 grams. The moisture varied between 77·5 and 87 per cent. The starch granules are oval, eliptic or club-shaped, the elongated grains are either straight or curved.

Dried and reduced to fine powder the rhizome yielded the following composition:—

Moisture	5·50
Ether extract	·75
Albuminoids	6·75
Carbohydrates	66·65
Fibre	10·65
Ash	9·70
	100·00
Total nitrogen	1·33
Albuminoid „	1·08
Phosphoric acid	·36
Sand	1·95

The ether extract consisted of an oleoresin dissolving in sulphuric acid with a yellowish-brown colour changing to blue. An alcoholic extract of the powder contained a large quantity of sugar. The food is fairly nutritious and contains a larger proportion of fibre than most tuberous substances used in food.

s.—There has been much confusion between this plant and the **Costus** of ancient writers. **Costus** is an important spice, incense, and medicine known from antiquity down to the present time. It is the root of **Saussurea Lappa**, *C. B. Clarke* (**Aucklandia Costus**, *Falc.*) which is remarkably similar to elecampane both in external appearance and structure, being an allied plant of the composite order. The true origin of Arabian **Costus** was shown by Dr. Falconer in 1845 (*Transactions of the Linnean Society*, XIX., 23), and a full account of its use in mediæval Europe and its substitutes was written by Dr. M. C. Cooke in 1877 (*Pharmaceutical Journal* (series 3), VIII., 41). **Costus** known also as *Kut*, *kust* and *putchuk* is collected in Kashmir and is sent to Bombay and Calcutta where it is exported in large quantities to China to be used in incense.

Costus of the ancients.

G. I. C. P. O.—No. 445 R. E. P.—18-8-1906—25,00—H. R.

(Vegetable Product Series, No. 95.)

THE

AGRICULTURAL LEDGER.

1906—No. 3.

ACACIA CATECHU.

(CUTCH.)

[*Dictionary of Economic Products, Vol. I*, A. 135-199.]

Composition and Trade Forms of Indian Cutch, by DAVID HOOPER, F.C.S.

Introduction.

INTRODUCTION.

The present Agricultural Ledger is written with the object of bringing together information on the manufacture, trade forms and composition of Indian and Burmese cutch. Reference is made to the distribution of the **Acacia Catechu** and the centres of the cutch markets, which hitherto have but been the subjects of scattered notes in periodicals. Analytical tables are given of the composition of most of the available trade varieties of cutch and these will enable an estimate to be made of their comparative values. For medicinal purposes it is important to know the amount of astringency, and the presence and nature of impurities to be met with in the Indian samples, in order to compare them with Gambier of the Straits Settlements which is appreciated as a substitute in this country and is being recognised in the Pharmacopœias of other nations. The trade in cutch has been declining of late years, and it is hoped that the publication of these results will give an impetus to an important indigenous industry.

TREES WHICH YIELD CUTCH.

The cutch tree of India is known as the *Khair* and the extract is called *Kat, Kath* or *Katha*. The **Acacia Catechu**, *Willd.*, was regarded as a distinct species by Dr. Roxburgh, and the allied species, **A. catechuoides** and **A. Sundra,** were recognised as being used with the first in the preparation of the commercial extract. In 1897, however, Lieutenant-Colonel D. Prain, LL.D., F.R.S., regarded these three trees as varieties of one species, and in a paper entitled "Some Additional Leguminosæ" (*Journal Asiatic Society of Bengal*, Vol. LXVI., Pt. II., pp. 508-9) he established the characteristics and respective areas of distribution of the three forms of the plant.

CUTCH-YIELDING TREES.

Colonel Prain's conclusions may thus be summarised :—

(*a*) **A. Catechu**, *Willd.* (proper). This is the most Northern form having been recorded as met with in Hazára, Kashmir, Simla, Kángra, Garhwál, Mussoorie, Central India, Bihár and south to Ganjam. It has never been found in the Eastern Himalayas nor in Assam, and it has only once been reported as met with in Burma, *viz.*, at Pegu, where according to Kurz it is called *sha*. This is therefore the kath-yielding form of Kumaon or *papri khair* as it is sometimes called.

(*b*) **A. catechuoides**, *Benth.*, is met with in Bengal from Monghyr and Patna to Sikkim, Assam and Burma. Though quite common in Pegu and Prome it has not as yet been collected in the Shan Hills nor in Upper Burma to the north of Ava. This is therefore the cutch-yielding form of Burma; and Pegu or Rangoon cutch is the chief commercial form of the extract.

(*c*) **A. Sundra**, *DC.* Colonel Prain distinguishes this as the Southern and Western plant which affords the cutch of Madras and Bombay Presidencies. It is very common from Coimbatore northwards to the Deccan, Kángra and the Konkan, and has been recorded as far towards the north-west at Kathiawar and in Rajputana, also to the north-east in Burma, at Segain, Mandalay and the Shan Hills. It is the *lál khair* or Red Catechu.

How far these varieties of the tree influence the composition of the extracts made from them will be noticed in discussing the chemical composition of trade samples. Before dealing with that subject it will be convenient to refer to the districts in India where cutch is manufactured and to describe the peculiarities of manufacture that regulate the trade forms.

WHERE MADE.

Bengal.

Bengal.—One of the earlier writers on the industries of this province is Dr. Buchanan-Hamilton whose diaries were edited by Montgomery Martin. He described in 1838 the manufacture of *Khair* from **Acacia Catechu** in Dinajpur. The tree is common in the woods of Peruya, Jagadol and Ghoraghat; but it is only in the first that any of the drug is prepared. The number of people employed in this manufacture is small. Trees are selected that are at least two feet in circumference and these are old; for in this district the tree does not grow to a large size. The bark and white wood are removed and then the heart-wood is cut into small pieces and beaten into a kind of stringy substance by means of an instrument called a *dhenki*. Equal quantities of this and of water are put into earthen pots, each holding from 10 to 20 seers (20·5 lbs. to 41·1 lbs.) and are boiled for about six hours. Each fire contains two or three pots. The decoction is then decanted into a pot, and is formed into two kinds of catechu, *khair* and *papri khair*, the first dark and the second light coloured. The first is made by simply allowing the extract to dry in the pot without addition, the second is made by putting some ashes of cow-dung

CUTCH WHERE MADE.

in the bottom of the cooler. The ashes are covered with a fold of muslin, over which the warm extract is poured. It is sold to the merchants in these pots and by them is formed into balls and dried in the sun. The season for manufacturing cutch is from November to March ; none can be made in these districts in the rainy season.

Maldah.

A small quantity is made in Maldah, but the Maldah Khair is not reckoned of best quality, and the tree is rather scarce in the neighbourhood.

Chutia Nagpur.

The industry is more or less reserved in Palamau in Chutia Nagpur by an inferior caste called Mallahs, who extract *kath* from November to March. They do not cut very small trees, which have little or no heart-wood, and they never touch old trees. Trees from 2′ to 4′ in girth are generally cut for the purpose. The sapwood is removed and the heart-wood is split up into thin chips with axes. The chips are then boiled in earthen vessels for 10 or 12 hours and the solution obtained is poured in separate vessels and boiled over again, and this goes on till the liquor acquires the consistency of a thick syrup, which is then kept in big bamboo baskets lined outside with earth and cow-dung. After a few days, when the thick syrup becomes paste-like, it is poured over *chatdis* (mats) strewn over with ashes, and made into any forms the manufacturers like. The *kath* or cutch obtained by first boiling the chips is of best quality, and that obtained by second boiling is of second quality, and sometimes a third boiling is made when a third class extract results.

In other parts of Chutia Nagpur *kath* is prepared and sold in the Manbhum and Jhalda pergannahs. The annual production in Manbhum is estimated at 40 or 50 maunds (29·38 cwt. or 36·73 cwt.), and the rate of sale is about four seers (8·22 lbs.) a rupee (1*s.* 4*d.*) when dry. In Jhalda the outturn is smaller, as the neighbouring jungles contain fewer trees.

Dr. McCann in his "Dyes and Tans of Bengal" (1883) reported that about 1,000 maunds (734·69 cwt.) of catechu was annually consigned from Hazaribagh in Chutia Nagpur to Calcutta, where it sold at from R8 to R12 (10*s.* 8*d.* to 16*s.*) per maund (82⅔ lbs.).

Patna is the emporium of Janakpuri cutch and of that made near Garhwa in Palamau, Chetra in Hazaribagh, Ahraura in Mirzapur and Bas Bareilly, Pilibhit and Katni Marwar.

Nepal. Tirhoot.

Janakpuri cutch is prepared in Nepal and the Nepal Terai and is brought to Patna through the frontier stations of Tirhoot, Champaran and Bhagalpur. It receives its name from the town of Janakpur (Pupri) in Muzaffarpur. It is manufactured at Raksal and Katkanwa in Champaran, Bairagania, Birganj and Janakpur in Muzaffarpur, Bhimnahar and Bhaptiahi in Bhagalpur, and Madhuapur in Darbhanga.

Janakpuri cutch.

Janakpuri cutch is made from the wood of the *khair* tree by boiling the chips in an iron pan and straining the liquor through cloth. It is again boiled until it becomes thick, when the extract is

CUTCH WHERE MADE.

spread over a cloth or gunny placed on sand and dried in the shade. It is supposed that drying in the sun has a deleterious effect and produces a black cutch of inferior quality. The only restriction on the manufacture is the payment to the Forest Department of ₹4 (5*s.* 4*d.*) for each maund (= 82⅔ lbs.) of extract prepared.

The cutch obtained in the Patna market is of the Janakpuri variety and is divided into three classes according to its quality—

	Per maund. = 82⅔ lbs. ₹
1. Pakra or hatipawn . . . (29*s.* 4*d.*)	22
2. Kachru . . . . (27*s.* 8*d.*)	20
3. Talia, pakri or kala . . . (21*s.* 4*d.*)	16

The first has an earthy pinkish fracture, and is full of catechin, the second is darker with a moderate amount of catechin, while the third quality is black in colour, having a brittle, shining fracture.

Orissa.

In 1893 the Secretary of the Bengal Chamber of Commerce wrote to the Reporter on Economic Products, suggesting an enquiry into the origin of the cutch made in Orissa and the Orissa Hill States. Armenian and Jewish traders are aware that before Burma cutch took possession of the market, Orissa cutch was well known in Calcutta. The Secretary of the Chamber had purchased cutch at Chandbali where it was called "Black Heart." It was badly prepared and was sold in hard dark coloured cakes. The enquiry was passed on to the Conservator of Forests, Bengal, and the following notes regarding the trade carried on in cutch in the Orissa Tributary States were supplied by the Officiating Superintendent, Cuttack.

The article is not considered a very paying concern in the Tributary Mahals, and the trade is confined only to the following six of the seventeen States :—Athmallik, Bod, Daspalla, Mohurbhanj, Pal Lahera and Talcher.

The Tributary Mahals forests do not abound in catechu plants, and where they do the manufacture of cutch is carried on to a very limited extent. It is manufactured by a professional class of aborigines called *khairas* or cutch manufacturers, the tract of the jungle being first leased either by traders from the plains or the *khairas* themselves. The quantity manufactured finds ready sale in the Garjat local markets and in Cuttack.

The quantity turned out is not large. In Athmallik the Maharaja reports the value of the manufactured article to be not more than ₹1,000 (£66 13*s.* 4*d.*) during 1893. In Bod and Daspalla, the annual outturn is estimated to be 300 maunds (= 220·4 cwt.) and 50 maunds (= 36·73 cwt.), respectively. In Mohurbhanj, Pal Lahera and Talcher the quantity manufactured is not more than sufficient for local consumption, though sometimes in the two latter the surplus is exported to Cuttack.

CUTCH WHERE MADE.

In the Buxa Forest Division, the trees are of the ordinary kind that grow plentifully along old river beds and on waste land all over the country. All trees yield more or less extract, but there seems to be a great difference in the quantities obtained from the wood. It appears that those most gnarled and creviced and generally badly used matured trees give the largest yield : this opinion is supported by the fact that the crystalline catechin may be picked out of the cracks and cavities in the heart-wood. If a khair tree be cut down in the rains a crystalline substance oozes out from the centre of the stump as well as from the log. A specimen of this was separated by boiling the chips cut as small as possible in a kerosine tin of water for half an hour; the decoction was then strained into shallow wooden boxes and set to cool. In from two to four days the catechin crystallised out and adhered to the sides and bottom of the box. Most of the dark brown liquid was then poured off and the balance was stirred up and turned into a filter-press and squeezed into a cake. The cake was then dried in the sun, after which it had a brown appearance from a portion of the tannin drying on the surface. This process aimed in getting catechin, and this could be obtained almost pure by washing with sufficient water.

Buxa in Northern Bengal.

Cutch may be made from the bark as well as from the heart-wood of the tree, but in the former case the extract is very black and, as shown by analysis, contains no catechin.

Assam.—The khair tree is distributed in this province and is abundant in the districts of Goalpára, Kamrup and Darrang, but no cutch has ever been made there on a large scale. The product is almost unknown among native manufacturers and in a commercial sense is almost non-existent.

Assam.

Central Provinces.—Regarding the trade in cutch in certain feudatories attached to the Sambalpur district, the following information has been communicated.

Central Provinces, Eastern parts.

Sonpur is a Native State lying to the south of Sambalpur district and the Mahanadi traverses it from north-west to south-east, so that whatever cutch is produced there is carried away by river to Cuttack and does not pass through Sambalpur. There is very little forest in the State, it is a plain country and has been to a great degree brought under cultivation, and it is not probable that there can be any considerable trade in cutch in this State.

Patna Native State lies to the south-west of Sonpur and only touches the Bargarh Tahsil of the district in the extreme south-west. It is reported that Patna is a well wooded State and it is probable that a fair amount of cutch is produced there. Everything not needed for home consumption is exported to Sonpur and thence down the Mahanadi to Cuttack. The production of cutch in Patna State is about equal to the production in Bamra.

Bamra State lies to the east of this district. It is covered with dense forest and yields a good supply of cutch. In Bamra the

CUTCH WHERE MADE.

Central Provinces, Eastern parts.

Feudatory Chief is the principal merchant and nearly all the cutch produced in the State is carried to his depôts and delivered to his agents at a fixed rate. The Chief's agents sell it to traders who carry it away by rail or river. The Feudatory Chief of Bamra has kindly furnished the following information regarding this subject :—

Cutch is produced in the Atpara, Naikool and Gourpali parganas of the Bamra State. The annual production does not exceed 250 maunds. No merchant purchases directly from the producers. All the cutch produced is purchased by the Chief at from 4 to 5 rupees (5*s.* 4*d.* to 6*s.* 8*d.*) per maund (=82⅔ lbs.) and is sold again at his depôts to merchants at from 7 to 8 rupees (9*s.* 4*d.* to 10*s.* 8*d.*) per maund. It is also probable that a small quantity is smuggled out of the State by traders without passing through the Chief's depôts.

Radakole is a State with more jungle than cultivation and the production of cutch there must be equal to the production in Bamra State. Some of the cutch produced in the western part of the State is carried by men or on pack bullocks to Sambalpur for sale, but the major portion goes down to the river to Cuttack or by road through Angul to Cuttack.

All the cutch exported from the feudatories of this district is usually in the form of soft cutch.

The Conservator of Forests reports that in Sambalpur earthen pots are used for boiling down the liquor. The thick liquid, when sufficiently concentrated, is poured into small cups made of palmyra or other leaves and exposed to the sun for 10 to 15 days, when the cutch becomes hard and dry. It is sold locally at 4 annas (4*d.*) per lb. or R10 (13*s.* 4*d.*) per maund (82⅔ lbs.).

Central Provinces, Central parts.

The Deputy Conservator of Forests, Seoni, describes the process of making the square-shaped cutch at Korai. When the extract is of the consistence of a thick paste it is poured into moulds made of fine sand. The sand absorbs what little moisture is still left in the paste and the Katha remains. This is cut into small blocks about two inches square by half an inch in thickness. These are sold by contractors in the Kampti market.

Central Provinces, Northern parts.

In Damoh, another district in the Central Provinces, the cutch boiling industry has been carried on for many years by professional *Khairwas*. The quantity of *Katha* manufactured in 1903-04 was about 400 maunds (=293·87 cwt.), the market value of which at R11 (14*s.* 8*d.*) per maund (82⅔ lbs.) was R4,400 (£293 6*s.* 8*d.*).

United Provinces.

United Provinces.—Major Madden during his tour in 1847 through "The Turaee and other mountains of Kumaun" (*Journal Asiatic Society, Bengal, XVII., 565*) describes the manufacture of kath or catechu by a class of Doms called *Khairias*, after the name of the tree. Trees with an abundance of red heart-wood are most esteemed, and these are reduced to thin slices and boiled in Kedgree pots. Madden speaks of the kath in the concentrated liquor crystallising on leaves and twigs thrown into the pots for this

purpose. Later observers state that twigs are not now used to assist crystallisation, and that the evaporating liquor is stirred with sticks dipped in castor oil to prevent frothing. There is a fair local demand for Kumaun kath, but the manufacture and trade are in the hands of poor unenterprising people, and there does not seem to be any promise of much expansion. Another evil threatening the once flourishing industry is the gradual extermination of the Khair tree by annual savannah fires; and Government propose to remedy this by reserving 12,000 to 15,000 acres of khair forest, and arranging for their protection against fire and grazing.

CUTCH WHERE MADE.

Bombay Presidency, North Kanara.

Bombay.—Dr. Buchanan-Hamilton describes the making of *cut* or catechu near Ankola in North Kanara during his tour in 1801. The trees grew spontaneously on the hills of the Konkan and were observed nowhere else in the peninsula. The extract was made by boiling the chips of the heart-wood in the usual way, and when it was sufficiently hard it was poured on to the ground covered with rice husks and made into balls about the size of oranges and dried in the sun seven days. These were sold to merchants residing at Dharwar and Stanore, who supplied the greater part of the peninsula with this article, which among the natives was in universal use. The greatest supply came from that part of the Konkan which was subject to the Marathas and was considered of very good quality.

Possibilities of Nasik.

In a recent Forest Report it is said that in the Nasik division of Bombay, Khair trees will never yield valuable timber and the extraction of catechu in these forests would produce a revenue which could not otherwise be tapped.

Gujarat.

People employed in Gujarat in the manufacture of kath or catechu are called Kathodias, an aboriginal tribe much resembling Bheels. The men bring in the khair wood from the jungle and cut it into chips; the women boil the chips and extract the kath.

The tree best suited for the purpose is one of from 25 to 30 years of age, and the more thin white lines visible in the heart-wood the greater is the quantity of kath it contains. The Kathodia tests whether the tree will pay to fell by cutting a small notch into the heart-wood.

After the tree is cut the Kathodia removes all the sap-wood, and a little of the heart-wood with it, from the bole, and takes it home to cut into chips, which he does with a small axe of a peculiar shape. The chips are about the thickness of wood used for match boxes and about a square inch in surface.

The chips are boiled in small earthen pots, with rather more than two quarts of water; the chips are renewed three or four times a day, three or four handfuls being put in each time. The water is poured off from time to time when considered sufficiently impregnated with kath into two pots kept on purpose, and allowed to go on boiling; fresh water is put into the pots from which the liquid has been poured off.

CUTCH WHERE MADE.

Gujarat.

At the end of the day the infusion in the two pots is poured into a wooden trough, about a yard long and eighteen inches broad, and goes through a peculiar process of straining. A woman takes a piece of blanket about a foot square, dips it into the infusion, stirs it about and then wrings it out again into the trough, holding it as high up as she can from a sitting position. This process goes on for about two hours, after which the trough is covered up with a lid made of split-bamboos, and the infusion allowed to throw down a sediment which is kath; all the water is poured off and the kath is made into small pats and allowed to dry.

Kath, ready made, is sometimes found in the centre of some trees. This kind of kath is the most valuable, and is called Khersal.

The Kathodias are employed in large gangs from 50 to 75 families (each family represents a kath furnace) by contractors who obtain permits from the Forest Department for the manufacture of kath and make their encampment near a river in the jungle so as to have a large supply of water at hand; a kath furnace has from eight to twelve pots placed in a double row. The two central ones are used to receive the liquid from the other pots.

Kath manufacture is very destructive, and should never be permitted in jungles where the khair grows straight or is accessible. If allowed, only such trees should be marked as are not fit for timber, by reason of their crookedness or other defect. In the Bombay Forests, where manufacture of kath is allowed, none but crooked trees unfitted for timber uses are felled, and every tree is previously marked for the axe by an officer of the Forest Department. [*J. Macrae, Indian Forester*, Volume I., (1875) 282].

Madras, South Kanara.

Madras.—In this Presidency cutch is most extensively manufactured in the Kanara district. The method of preparation in South Kanara is given in the District Manual, from which the following extract is taken:—

"The catechu trees are felled, and their branches and sap-wood removed. The heart-wood is then chopped into small chips about $1\frac{1}{2}$ inches by 1 inch in size. About $2\frac{1}{2}$ maunds (1·83 cwt. or $205\frac{5}{7}$ lbs.) of chips are put into an earthen pot containing a maund (=9·8 gallons) of water and boiled for two hours. When the active principle of catechu has separated from the chips, the decoction is strained into a trough placed at the foot of the still and immediately transferred to another vessel of which about half a dozen are placed on the ovens in a line. The chips once boiled are again mixed with the same quantity of water and again boiled. The process of boiling and straining is repeated six times and at every time the decoction obtained is strained and transferred to the pot containing the former decoction. The decoction is itself boiled again for about six or seven hours until it attains a dark brown colour and becomes gummy. It is then discharged into an open, shallow vessel and stirred by a ladle until it becomes semi-solid by oxidation, which it does in about five or six hours. It is made into balls, each of $1\frac{1}{2}$ inches in diameter, and the balls are rolled in ashes. The above preparation is said to produce 45 balls weighing $10\frac{1}{2}$ lbs. Here ends the work of the people—males

CUTCH WHERE MADE.

South Kanara.

and females of the Kudubi caste—engaged for the purpose. After receiving the balls from the Kudubis the contractor has to go through a further process of rubbing them five or six times for two or three days, heaping them upon an air-tight covering of ashes, in which state they are kept for three or four days, and then giving them another rubbing, after which they are spread out in the shade to dry; when dried the above 45 balls weigh about 9 lbs. The balls thus prepared are delivered over by the contractor to the Forest Department, which pays him the price agreed upon, *viz.*, R60 (£4) per candy of about 3,000 balls.

"The manufacture of catechu is carried on from about the end of December to the middle of March. It is confined to a jungle tribe, called *Kudubis*, who speak a dialect of Konkani and are said to have migrated into the district from Goa when it came under the sway of the Portuguese in the sixteenth century. When the Kudubi is engaged in the manufacture of catechu, he makes the site of the boilers his home, the Kudubi woman being as much essential to the work as the Kudubi man. The work of the male ends when he has felled the trees and cut the heart-wood into chips; all the rest of the process until the catechu balls are delivered to the contractor falling to the share of the female. The Kudubi gets from R1 to R1-4 (1*s.* to 1*s.* 4*d.*) for every 100 balls manufactured or R40 to R50 (£2 13*s.* 4*d.* to £3 6*s.* 8*d.*) for every 4,000, balls which is generally the unit of account between the contractor and the Kudubi. During the three years ending with the 31st March 1894, about 49 tons of catechu were manufactured at a cost of R11,630 (£775 6*s.* 8*d.*) and the sale of these realised R25,857 (£1,723 16*s.*), leaving a total profit of R14,227 (£748 9*s.* 4*d.*) or R4,742 (£316 2*s.* 8*d.*) per annum to the Forest Department. The manufacture of catechu gives employment to nearly fifty or sixty families of Kudubis and the average monthly income of a family amounts to about R8 (10*s.* 8*d.*)

"The catechu manufactured in South Kanara appears to command a higher price than the product of Mysore on account of the careful and neat method employed by the Forest Department in its preparation; the former fetches R135 (£9) per candy, while the latter scarcely realizes more than R100 (£6 13*s.* 4*d.*) The catechu manufactured in South Kanara is chiefly sold in Mysore where it is eaten with *pán* (betel leaf) and administered as a medicine to women immediately after confinement."

Market of cutch from South Kanara.

In 1903-04, 1,561 maunds (Madras maund = 25 lbs.) or 18·8 tons of catechu were made in South Kanara and sold for R13,953 (£930 4*s.*). The departmental cost of the extract was R172 (£11 9*s.* 4*d.*) per ton and it realised R801 (£53 8*s.*) per ton. A few tons were sold to the Harness and Saddlery Factory at Cawnpore, and the Mysore State took the remainder for consumption. In 1904-05, 1,466 maunds (16 tons) were made and sold for R11,431 (£762 1*s.* 4*d.*). The cost price being R160 (£10 13*s.* 4*d.*) per ton and the selling price R700 (£46 13*s.* 4*d.*). An interesting account of catechu and catechu boiling in South Canara, written by Mr. H. A. Latham, appeared in the *Indian Forester*, May 1906.

Burma.

Burma.—In Lower Burma the manufacture of cutch is carried on in much the same way as in other parts of India. If trees are plentiful the manufacturer makes an incision into the heart-wood before felling, to determine whether or no the wood is spotted or

CUTCH WHERE MADE.

Burma method of manufacture.

whether it contains *ugyi* (the Burma name for kersal). The presence of such spots indicates catechin and assures the outturn of a hard cutch which is of greater value than soft. The presence of *ugyi* is therefore of primary importance and trees without spots are rejected if there is a sufficiency of trees with them. According to Mr. H. Slave ("Cutch Manufacture in Burma," *Indian Forester*, 1892) cutch boilers recognise four varieties of **Acacia Catechu** distinguished by their bark and the colour of the heart-wood. These are Sha-ni or red cutch, Shaw-wa or yellow cutch, Sha-bya-Kyaung-mwe or blue cutch, and Sha-net or black cutch. Of these four varieties red cutch is considered the best, the cutch manufactured from the blue cutch will never set by itself, so it is always mixed with the extract from one of the other varieties.

The selected trees are deprived of their bark and sap wood and the logs are cut up into convenient lengths of about 7 feet. These logs are converted into chips about an inch square and a quarter of an inch in thickness. The boiling of the chips with water is conducted in several earthenware pots each containing about three gallons, and the extract is transferred to a large iron pan of the capacity of twelve gallons. The liquid is boiled down until it attains, with constant stirring, a viscous consistence. The cauldron is then taken off the fire, and to prevent the extract from solidifying at the top before it does so at the bottom, it is constantly stirred with a flat piece of wood shaped like a paddle until it is cold enough to be handled. It is then poured into a brick shaped mould, generally lined with leaves, and left to cool. The result is a mass of dark cutch varying in consistence according to the quantity of kersal contained in the wood used.

In Upper Burma the process of manufacture is generally the same as in the Lower Province. In 1890-91 cutch was being manufactured in the following seven forest divisions, that giving the largest outturn being placed first:—Minbu, Pyinmana, Yaw, Mu, Mandalay, Katha and Chindwin. In the Yaw Forest of the Mu division a somewhat different form of cutch is made other than that of the conventional article. The cutch is boiled in the ordinary manner, and is then thrown into a bamboo basket to see whether it will set. When it becomes hard it is put back into the cauldron and re-melted. A good quantity of *than* (**Terminalia Oliveri**) bark is added to give it a good colour and harden it. It is then thrown into small conical moulds made by pressing a blunt-pointed stick into the ground and lining the holes thus made with leaves of **Cassia Fistula** or a species of **Bauhinia**. When the cutch has solidified the leaf moulds are stripped off the cakes.

Markets of Burmese cutch.

This cutch is made specially for the Shan market and is only used for chewing. It is sold at Bhamo at R24 to R30 per cwt. The quantity produced is comparatively small.

Burmese cutch is often sold in the shape of small blocks. This

CUTCH WHERE MADE.

is accomplished by using a mould with the dimensions of 3′×8″×1,″ and before the cutch is thoroughly set it is cut into strips about 3 or 4 inches wide: the cutch then assumes the form of slabs found in the market, the dimensions of which are 3″×8″×1″.

Minbu.

From the Sinbyugyun forests of the Minbu division of Upper Burma varieties of cutch are known as black, yellow and red. The colours are said to be much more apparent where the cutch is fresh from the boilery. A forest official states that they are all manufactured by the ordinary Burmese process, the only difference being in the shape of the mould employed. The yellow cutch of Pegu occurs in roundish cakes about two inches in diameter and half an inch in thickness. The colour externally is yellowish-brown and internally reddish-brown. There is nothing in the analysis to account for the colour.

Prome.

In the Padaung township of the Prome district a few boilers adopt a somewhat different process and form the product into balls. Only earthenware pans are used for boiling and evaporating the liquor. The thick extract is poured into a wooden trough and agitated by a long stirrer until it commences so solidify. It is then rolled into balls about the size of marbles. The balls are dried on palm leaves near a fire. As soon as they begin to swell slightly they are removed and are ready for market where they sell for ₹30 (£2) per cwt.

Experiments in India.

MANUFACTURE, IMPROVEMENT OF.

Experiments have been made in India to elucidate some of the obscure points connected with the native methods of manufacturing cutch. Dr. Warth in 1890 tested the quality of the wood of the Catechu tree by taking several samples showing a large and small proportion of spots in the heart-wood, to verify the statement of Kath makers that the white spotted wood yielded a superior extract than that made from black heart-wood. The result of the experiments showed that spotted wood gave more extract as well as more catechin. Authenthic specimens were collected in Oudh and Burma and were of the following description: —

Recognition of good wood.

Oudh No. 1.—Reported unfit for making *Kattah*, 1 in 1,000 of white pores.

Oudh No. 2.—Reported good for *Kattah*, 1 in 6 of pores.

Burma A.—No white spots, but *khersal* present.

Burma B.—Exhibiting white spots, 1 in 20.

Burma C.—White spots 1 in 3.

	Maximum per cent. extract.	Mean per cent. Catechin.	Catechin per cent. in wood.
1	14	36	5
2	24	40	9
3	17	14	2
4	16	31	5
5	20	28	6

CUTCH MANUFACTURE, IMPROVEMENT OF.

As might be expected these results show that deposits of catechin exhibited in the wood contribute to form an extract of good quality; on the other hand, there is evidence of good cutch being manufactured from wood reported by professional boilers to be unfit for use.

Cutting up wood.

Dr. Leather next dealt with the best methods of cutting up the timber, with the effect of different kinds of water, the quantity of water required and the time which was essential to boil the wood.

1. With regard to the form in which the wood should be used. Experimenting with wood in the form of chips, sawdust and shavings and treating them with boiling water under similar conditions, it was shown that the chips yielded 3·8 per cent. of extract, the sawdust 12 per cent. and the shavings 15·1 per cent. The conclusion is thus easily drawn that the finer the state of division of the wood the greater quantity of extract is obtained.

Amount of water for boiling.

2. The second point was the amount of water to be used in extracting the wood. Experiments in this direction proved that ten parts or less of water to one of wood was ample for exhausting the soluble contents. In this connection it was shown to be immaterial to the process whether the water used was hard or soft.

Time required for extraction.

3. The time required for extraction. The native cutch-makers boil the wood for several hours, but it appears that half an hour is quite sufficient to exhaust the wood. The prolonged boiling is conducted by the cutch-maker as the second part of the process, *viz.*, the concentration of the extract.

The Yield.

Yield.

The amount of extract obtained from the heart-wood of the khair tree varies considerably in individual samples. Dr. Warth obtained 6 to 14 per cent. in unspotted heart-wood, and 4 to 24 per cent. in spotted heart-wood from the United Provinces, and in samples from Burma 12 to 17 per cent. in unspotted wood and 14 to 20 per cent. in spotted wood. In Pegu, where the manufacture is on a large scale, it is calculated that 250 to 300 pounds of cutch is yielded by 1 ton of wood. This is equivalent to 11·1 to 13·3 per cent. A sample of the chips used in the Burma factory was estimated by me in 1900 and was found to contain 14·3 per cent. of total dry extract: a very fair proportion of the soluble contents is therefore extracted by the factory process.

In the South Canara District, Madras, the yield of extract from heart-wood chips is about 11 per cent.

Trade Forms of Cutch.

TRADE-FORMS.

Pegu cutch.

Pegu Cutch.—This form enters Commerce through Rangoon or Calcutta. It occurs in large solid masses, sometimes weighing one hundredweight, or is made up of flat quadrangular cakes about 6 inches long and 1 inch in thickness. Both forms are usually wrapped in leaves or have leaf impressions on the outside. The leaves employed for this purpose are those of **Dipterocarpus tuberculatus, Stephegyne diversifolia** and the scabrid leaves of

CUTCH TRADE-FORMS.

Tectona hamiltoniana. This cutch is dark reddish-brown and breaks with a shining fracture into angular and irregular fragments showing a compact or porous structure according to the heat employed in drying. Scratched with a knife, light reddish-brown markings are exposed. In the Calcutta market this form is known as *Pegu, Rangooni* or *Mogai Khair*, and is sold at R26 (£1 14*s.* 8*d.*) per maund (82⅔ lbs.)

Janakpuri.

Janakpuri khair.—This is the pale catechu of Bengal made, as already stated, in Gya, Chatra and Hazaribagh, and brought into Calcutta from Patna. It is used extensively by the Kabirájs in medicine and by Marwaris and Bengalis for chewing purposes. It occurs in large masses or flattened cakes or balls and is of various qualities ranging from R28 to R23 (£1 17*s.* 4*d.* to £1 10*s.* 8*d.*) per maund (82⅔ lbs.). The larger blocks are called *hathi pà* (elephant's foot) from their resemblance to the shape and colour of an elephant's foot. Smaller forms are made into square cakes or rounded balls, both showing a laminated structure due to the presence of catechin.

Tela khair.

Tela or tele khair.—This is the dark or black cutch of Bengal brought from Patna to Calcutta and sold in various shapes. It occurs in masses of a black or pitch-like appearance having a shining fracture. It is probably a by-product in the manufacture of the light catechu. There are two principal varieties of this cutch, the name *tela* generally being applied to the crude article as it is imported, and *mansarami*, a refined cutch of better quality. In the refining process the catechu is first dissolved in boiling water, the liquid strained from impurities and then evaporated by boiling. The residue before it hardens is then cast into two shapes :—

(*a*) round or *bélguti* (from *bél*, the fruit of **Ægle Marmelos** which it resembles) and

(*b*) square, called *chauk*, *chaukhabi* or *kalagaran*.

Tela cutch is the cheapest kind sold, costing only R12(16*s.*) per maund (82⅔lbs.). It is this kind which is used with concrete in preparing the roofs of houses, as it is supposed to enter into combination with the lime and render the composition more durable. *Tela khair* is also moulded into various ornamental articles and made as presents offered at wedding ceremonies.* It is on account of its low price used by the poorer classes for edible purposes.

Pale cutch.

Pale cutch of the United Provinces and Kumaon.—Is lighter in colour than that of Bengal and contains abundance of catechin.

Cawnpuri cutch

Cawnpuri cutch.—Is a variety of Kumaon cutch and occurs in irregular or rectangular cakes about 2 inches square, dull pinkish fawn inside, and breaking with a tough earthy fracture showing a laminated structure. The price is R32 (£2 2*s.* 8*d.*) per maund (82⅔lbs.), and as its name implies is exported from Cawnpur.

* See "Some Instances of Vegetable Pottery." *Journal of the Asiatic Society of Bengal*, Vol. II., Pt. 3 (1906), page 65.

CUTCH TRADE-FORMS.

Chana makhan khair.

Chana makhan khair.—Literally "curd and butter cutch," is a pure form of Kumaon cutch used largely in the Benares district. It occurs in rectangular blocks, somewhat smaller in size than the Cawnpur kind, and is of a more uniform consistence and paler colour. It is the dearest cutch in the market as it sells for ₹35 to ₹40 (£2 6*s.* 8*d.* to £2 13*s.* 4*d.*) per maund (82⅔ lbs.), and is used almost exclusively for chewing purposes.

Gambier.

Gambier.—This well-known article is imported from Singapore and is employed in dyeing as well as for chewing by Bengalis. It is the pale or (from its shape) cube catechu of commerce, but its most approximate term is gambier, which distinguishes its origin from that of the numerous Indian varieties of cutch. Gambier is called *papri, gata* or *gooti khair* in the Calcutta market where it sells for ₹17 (£1 2*s.* 8*d.*) per maund (82⅔ lbs.).

Prepared or mixed cutch.

Prepared or mixed cutch.—In addition to the simple extracts various preparations are locally sold in the market. A peculiar mixture named *gora khair* is made in Calcutta from gambier, Janakpuri cutch and *lál mati* (red earth). This appears as a tough extract of a reddish colour and is invariably wrapped in leaves of the *sál* tree (**Shorea robusta**). It is also called *sálpata-wala* from the fact of these leaves being used as a covering. The soft extract is sold at ₹12 (16*s.*) per maund (82⅔ lbs.); it ultimately dries to a hard cake.

Kaya khair.

Kaya khair.—This is another preparation of cutch made by mixing together gambier and tela cutch, coriander, caraway, anise, cloves, cinnamon and cardamom with the flowers of the kaya or screw pine—**Pandanus fascicularis** (*Syn.* **P. odoratissimus**). The moist mixture is wrapped in leaves of pandanus and allowed to dry at first for four or five days in the shade and finally in the sun. It is prepared by the middle and upper classes of Hindus for domestic use and is not sold in the bazar. The sticks of kaya khair are about 6 inches long by one inch in diameter.

Bombay cutch.

Bombay cutch.—Catechu in balls. This form consists of balls about as large as an orange, very hard and heavy, of a ferruginous aspect externally, brittle and black internally. Another form occurs in a flattened condition; the cakes originally, in all probability, globular, and of about the same dimensions, but pressed out of shape before being perfectly dried. The globular form is made in Kanara and, according to Dr. Hamilton and Major Mackintosh, on the Malabar coast of which Bombay is the entrepôt.

Sir George Birdwood in "Bombay Products" describes four kinds of Bombay cutch—

(1) Kanchu or Dharwar, flat, round cakes, two inches in diameter and one inch thick; dark brown in colour, and preserved in bájri husks.

(2) South Konkan, covered with paddy husks.

(3) Khandesh, in angular grains, pale earthy brown internally, darker externally.

CUTCH TRADE-FORMS.

(4) Surat, in irregular lumps of a light brown colour, from the size of a hazel-nut to a walnut. This is the *katha suffaid*, the pale or white catechu of Bombay.

Specimens examined.

The following is a brief description of the various samples of cutch exhibited in the Indian Museum and submitted to analysis :—

336. Cutch, Forest Officer, Surat, Bombay.	Small lumps about 1 inch across, flat on one side, brown externally, dull fawn within; fracture earthy, showing white spots.
342. Cutch, Forest Officer, Nasik, Bombay.	Ditto ditto.
887. Prepared cutch, Forest Officer, Tharrawady Division, Pegu Circle, Burma.	Dark chocolate, dense fragments.
888. Ditto ditto.	Nearly black, shining fracture.
889. Sha, ditto ditto.	Ditto ditto.
896. Cutch, ditto ditto.	Similar to 887.
1436. Cutch, Forest Officer, Kumaon, North-West Provinces.	Dark brown outside, light brown within; fracture earthy with laminated structure.
2344. Soft cutch, Conservator of Forests, Tharrawady Division, Pegu Circle, Burma.	Ditto ditto.
2345. Hard cutch, ditto ditto	Black irregular masses with shining fracture and air spaces.
2346. Ditto, Conservator of Forests, Yaw Division, Pegu Circle, Burma.	Ditto ditto.
2347. Soft cutch, ditto ditto	Very dark brown shining masses with reddish dust.
2348. Black cutch, Conservator of Forests, Minbu Division, Pegu Circle, Burma.	Similar to 1436 in appearance.
2349. Yellow cutch, ditto.	Dark reddish-brown or chocolate cakes.
2350. Red cutch, ditto.	Reddish-brown, dense, irregular and dull fracture.
3361. Cutch, Assistant Conservator of Forests, Kamrup, Assam.	Black and reddish-brown, irregular fracture.
3362. Ditto ditto	Black shining masses with porous structure.
3391. Cutch, Pegu No. 1, Burma, from Calcutta market.	Brownish-black, shining fracture; covered with smooth leaves.
3592. Ditto No. 2, Burma, from Calcutta market.	Dull brown, like 'clinkers,' containing visible impurities.
3393. Cutch No. 1 *var.* Tela (Mansarami), from Calcutta market.	Dull earthy brown, containing visible impurities.

CUTCH TRADE-FORMS.

Specimens examined.

3394. Cutch No. 1, Janakpuri, from Calcutta market.	Stratified masses showing black, chocolate and light brown layers.
3395. Cutch No. 2, Janakpuri, from Calcutta market.	Ditto ditto.
3396. Cutch No. 3, Janakpuri, from Calcutta market.	Ditto ditto.
3397. Cutch *var.* Tela (Telengar), from Calcutta market.	Black coloured masses with whitish earthy covering, and lustrous fracture.
3400. Cutch *var.* (Chaukhabi), from Calcutta market.	Brownish-black, dense lumps with leaf impressions.
3401. Cutch (Salpatawala), from Calcutta market.	Rectangular slabs 6 × 3 inches, dark reddish-brown or chocolate in colour with leaf impressions.
3413. Black cutch, Conservator of Forests, Pegu Circle, Burma.	Blackish cone-shaped pieces; fracture lustrous.
3428. Yellow cutch, ditto	Flat cakes of about 1½ inch diameter, light yellowish-brown outside and reddish-brown within; fracture brittle, lustrous and porous.
5029. Cutch, Conservator of Forests, Seoni Circle, Central Provinces.	Blackish-brown cakes 2″ square by ½″ thick. One side with earthy impurities, as if dried on soil.
5805. Cutch, from Calcutta market.	Dark reddish-brown; fracture shining.
6143. Cutch, Deputy Conservator of Forests, Palamau Division, Bengal.	Square or oblong cakes, 2″×2″ or 2″×3″, shining dark brown stratified inside with light brown.
6144. Ditto ditto .	Dull blackish masses.
6145. Ditto ditto .	Shining black masses, porous; impurities present.
7806. Extract prepared in Glasgow by vacuum process.	Coal-black extract; shining fracture.
9065. Catechu tannin, from Conservator of Forests, School Circle, Dehra Dún.	Black extract with conchoidal fracture.
9066. Catechin, ditto ditto .	Light pinkish-brown masses with earthy friable fracture.
10084. Extract, Tezpur, Assam.	Brownish-black cakes, uniform, and shining fracture.
10330. Ditto, Inspector-General of Forests.	Brownish-black, porous shining pieces.
10580. Ditto, Deputy Conservator, S. Circle, Cent. Provs.	Dull brownish-black; fracture stratified.
11036. Ditto, Conservator of Forests, W. Circle, Upper Burma.	Reddish-black uniform; fracture conchoidal.
11844. Ditto, Divisional Forest Officer, Kanara, W. Division.	Balls with ashy white surface, blackish brown within.

CUTCH TRADE-FORMS.

Specimens examined.

11979. Black cutch, Director, Land Records and Agriculture, Burma.	Brownish-black, shining, somewhat porous, wrapped in leaves.
13033. Kumaon, Director, Land Records and Agriculture, United Provs.	Small oblong cake, light brown, fracture stratified.
13783. Madras, through Board of Revenue.	Brownish-black, porous, leaf impressions.
14405. Bombay-Burma Trading Corporation, Ld.	Oblong cakes $2'' \times 6'' \times 1''$, brownish-black, porous, reddish-brown when scratched.
16951. Hard cutch, Deputy Conservator, Depôt, Agency Division, Rangoon.	Reddish-brown to blackish-brown, enveloped in leaves.
16959. Soft cutch, Deputy Conservator, Pakokku, Burma.	Brownish-black uniform, slightly porous.
16960. Hard Cutch, ditto ditto .	Brownish-black, uniform, dense.
16961. Superior cutch, ditto .	Dark reddish-brown.
17058. Deputy Conservator, Bahraich.	Dark reddish-brown lumps of about a pound in weight.
17933. Yellow cutch, Pegu Circle, Burma.	Reddish-brown cakes.
19794. Ditto, Mandalay, Burma	Brownish-black, porous, shining.
19842. Ditto, Angul Division .	Dense chocolate-like masses.
21383. No. 1, Deputy Conservator, Southern Shan States, Burma.	Conical lumps like pastiles, $1\frac{1}{2}$ inch long, light reddish-brown.
21383-1. No. 2, ditto ditto . .	Square or oblong cakes $1'' \times \frac{1}{4}''$, light reddish-brown.

CHEMICAL COMPOSITION.

Chemical Composition.—The active astringent principles of cutch are a tannin formerly known as catechu-tannic acid and a crystalline body named catechin. The value of cutch as a dyeing and tanning agent depends upon the amount of these two substances, while at the same time they are a measure of its suitability as a medicine.

Davy, 1803.

Sir Humphry Davy in 1803 was one of the first to investigate the chemical properties of catechu, and his results were communicated to the Royal Society of London in a paper, entitled "An account of some experiments and observations on the constituent parts of certain astringent vegetables: and on their operation in tanning." By Humphry Davy, Esq., Professor of Chemistry in the Royal Institution. The paper was communicated by the Right Honourable Sir Joseph Banks, Bart., K.C.B., P.R.S., and was read February 24th, 1803. (Philosophical Transactions, Volume 93, 252.) In the third section of his paper he discusses his experiments and observations on "Catechu or Terra Japonica." The material was rightly described as an extract from the wood of a species of Mimosa (the

CUTCH, CHEMISTRY OF.

former name for Acacia) found in India. There were two kinds of extract known in England at that time, one from Bombay of a uniform texture and of a red-brown tint, and the other from Bengal of a paler and more friable character and with a fracture presenting strata of chocolate and red-brown colours. It may be of interest to quote Davy's analyses of these two samples.

	Bombay.	Bengal.
Tannin	54·5	48·5
Extractive matter	34·0	36·5
Mucilage	6·5	8·0
Residue, chiefly sand . . .	5·0	7·0
TOTAL .	100·00	100·00

The tannin was estimated by precipitating the infusion with a solution of gelatin and weighing the compound. In the "extractive matter" was recognised what we now know as catechin, by its sweet and astringent taste, its greater solubility in boiling than in cold water, and the colour of its solution turning red on exposure to the air. Davy observes that the pale catechu is that most sought after in India, and the peculiar sweetish taste of the extractive matter (catechin) which it contained probably rendered it so agreeable to the Hindus for the purpose of chewing with betel nut.

Napier, 1875.

In a "Manual of Dyeing," James Napier (1875), there are given analyses of samples of catechu in the European market derived from Bombay, Bengal and Malabar. The Bombay sample yielded 52 per cent. of tannin, Bengal 49·5 and Malabar 45·8 per cent. The balance is returned as gum, extractive and colouring matter and impurities.

Analyses by Prof. Proctor.

To ascertain if there was any uniformity in the composition of cutch, I applied to Professor H. R. Proctor of Leeds, and he obligingly placed at my disposal the following analyses of extracts from **Acacia Catechu**:—

	Tanning matter.	Non-tanning matter.	Insoluble.	Water.
Dark Cutch . . .	58·9	1·0	19·1	12·0
White cutch of kath . .	72·2	5·8	6·8	14·2
Yellow cutch, Pegu, Burma .	69·2	8·0	10·4	12·4

CUTCH. CHEMISTRY OF.

Professor Proctor also forwarded some figures of recent analyses of extracts which were supposed to be derived from **Acacia Catechu.**

Analyses by Prof. Proctor.

Mark.	Tanning matter.	Non-tanning matter.	Insoluble.	Water.	Tanning on dried extract.
Drysdale . .	42·2	25·6	7·6	24·6	55·8
Salatiga . .	30·8	29·7	2·2	37·3	49·1
B. B. Flag I .	62·6	12·0	10·0	15·4	73·9
B. B. Leurel II .	59·6	15·5	7·6	17·3	72·0
B. Star 3 . .	46·5	23·2	14·9	15·4	54·9
41 . . .	41·5	17·6	4·6	36·3	65·1
42 . . .	29·6	18·8	31·1	20·5	37·3
Pegu . . .	30·0	35·4	0·7	24·9	39·9
Assam . . .	46·4	34·3	2·7	16·6	55·6
Ame . . .	45·7	19·8	15·8	18·7	56·2

Analyses made in Calcutta.

The following tables give the result of the analyses of several samples of cutch exhibited in the Indian Museum. Their appearances have been described on pages 37 to 39:—

Indian Cutch.

	Water.	Tannin.	Catechin.	Non. Tan. sol.	Insol. org.	Ash.	Spirit extract.
336 Surat, Bombay . . .	14·0	37·0	16·0	28·9	2·5	1·6	77·8
342 Nasik, „ . . .	13·4	37·4	15·6	26·8	4·0	2·9	78·5
11844 Kanara, Bombay . . .	11·6	39·8	3·9	34·7	4·5	5·5	60·7
1436 Kumaon, United Provinces .	12·0	42·9	33·0	3·2	2·6	6·3	67·3
13033 „ „ „ .	14·1	39·1	40·8	...	2·5	4·9	78·8
3393 Tela, Mansarami, United Provinces	9·7	17·3	1·7	29·8	14·0	27·5	27·0
3394 Janakpuri No. 1, United Provinces	13·0	40·7	16·8	24·0	2·8	2·7	68·9
3395 Janakpuri No. 2, United Provinces	13·5	36·8	17·3	28·4	3·5	1·5	69·6
3396 Janakpuri No. 3, United Provinces	12·5	38·8	17·2	26·4	3·3	1·8	75·1
3397 Telangir, United Provinces .	8·0	30·1	2·0	29·6	4·6	25·7	49·0
3400 Chaukhabi, United Provinces .	9·2	27·6	4·5	22·8	9·6	26·3	45·8
3401 Salpatawala No. 3, United Provinces	8·0	15·2	4·0	25·2	9·3	38·3	32·0
9065 Catechu-tannic acid, United Provinces	11·7	43·3	2·5	32·5	4·9	5·1	55·6
9066 Catechin, United Provinces .	13·3	8·7*	36·8	10·9	20·4	9·9	59·6
17058 Bahraich, „ „ .	11·5	40·2	13·4	29·8	1·1	4·0	80·0
5029 South Circle, Central Provinces.	11·9	30·3	12·3	33·7	5·2	6·6	67·7
10580 „ „ „ „ .	11·1	29·7	12·0	35·0	6·8	5·4	57·7
6143 Palamau, Bengal . . .	12·8	36·4	18·3	19·3	5·5	7·7	68·1
6144 „ „ . . .	10·4	29·5	3·4	33·4	5·6	18·7	32·0
6145 „ „ . .	10·7	33·1	1·2	36·7	3·7	14·6	43·6
19842 Angul, Bengal . .	12·1	46·0	4·5	31·2	1·5	4·7	60·0
3361 Kamrup, Assam . . .	10·7	50·0	9·7	23·1	4·3	2·2	80·0
3362 „ „ . . .	11·0	45·2	2·8	34·9	2·8	3·3	66·0
10084 Tezpur, „ . . .	11·6	42·5	11·6	26·0	5·4	3·5	77·9
13783 Madras	12·5	45·5	5·6	29·6	2·9	3·9	69·5
89781 Kurnool, Madras . . .	13·0	45·0	3·5	31·8	2·2	4·5	62·0

* Estimated by another method, tannin by hide-powder . 34·8

CUTCH, CHEMISTRY OF.

Analyses made in Calcutta.

Burma Cutch.

	Water.	Tannin.	Catechin.	Non. tan. sol.	Insol. org.	Ash.	Spirit extract.
887 Tharrawaddy	11·8	46·1	5·2	33·0	2·0	1·9	77·8
888 „	11·9	48·6	5·5	28·3	3·2	2·5	76·0
889 „ "Sha"	12·3	44·5	12·6	25·8	2·6	2·2	69·0
896 „	10·9	54·6	3·6	26·3	2·2	2·4	76·9
2344 „ Soft	10·5	50·2	4·6	28·5	4·1	2·1	75·5
2345 „ Hard	10·1	49·7	2·8	31·0	3·0	2·4	73·0
2346 Yaw Division, Hard	11·5	40·4	2·2	40·0	3·1	2·8	62·0
2347 „ „ Soft	10·3	46·8	2·4	37·2	1·5	1·8	71·6
2348 Minbu, Black	7·2	19·4	10·1	10·0	3·7	49·6	30·3
2349 „ Yellow	11·2	41·7	5·8	38·2	·4	2·7	62·7
2350 „ Red	11·4	45·5	5·1	33·4	·7	3·9	70·7
3391 Pegu, No. 1	11·5	48·2	2·1	32·7	3·4	2·1	69·1
3392 „ No. 2	9·5	19·7	...	28·5	14·2	28·1	32·3
3413 „ Black	10·9	40·2	...	44·9	1·9	2·1	69·7
3428 „ Yellow	11·2	42·6	13·6	30·4	·4	1·8	73·5
5805 Burma (Calcutta Bazar)	10·7	44·3	3·5	34·1	1·9	3·5	66·3
7806 Vacuum made	10·9	48·9	...	34·9	1·9	3·4	68·8
7964 Old sample	8·4	14·1	2·6	26·1	12·0	36·8	23·7
10330 Pegu Cutch	10·5	44·2	6·8	32·3	3·6	2·6	68·5
11036 W. Circle, Upper Burma	11·4	47·5	2·5	33·5	3·5	1·6	70·0
11979 Black Cutch	10·6	45·7	2·4	35·3	3·7	2·5	67·0
14405A Rangoon	11·5	40·1	4·0	40·0	2·6	1·8	69·0
14405B „	10·6	46·2	5·9	42·1	3·3	2·5	75·0
14405C „	11·6	43·7	4·3	35·6	2·0	2·8	63·0
14405D „	11·0	41·4	3·3	37·6	2·9	3·8	69·8
14405E „	12·0	31·8	1·1	35·9	6·6	12·6	47·4
16951 „ Hard	11·6	43·2	2·2	38·1	1·3	2·8	67·4
16959 Pakokku, Soft	11·4	47·2	1·8	34·5	2·4	2·7	62·0
16960 „ Hard	12·9	52·2	2·4	28·2	2·2	2·1	68·5
16961 „ Superior	11·3	54·8	4·8	25·2	1·3	2·6	72·2
19794 „ Mandalay	11·5	38·7	9·4	33·5	2·8	4·1	58·2
21383 Shan States	13·6	35·6	8·9	37·5	2·0	2·4	64·8
21383-1 „ „	14·1	33·5	13·2	35·1	1·1	3·0	62·5
25327 Rangoon (vacuum made)	11·2	41·0	11·7	33·1	1·1	1·9	72·1
Average of 31 good samples	11·4	44·3	5·0	34·0	2·4	2·9	70·0

Methods of analysis.

The methods employed in examining these samples may be briefly stated.

The tannic acid or tannin was estimated by hide-powder. The prepared hide-powder was digested with chrome alum and washed till free from sulphates and strained. The moist hide was then mixed with a measured quantity of tannin liquor previously prepared by hot water, and shaken together, until the tannin was absorbed from solution. The weight of total solids of an aliquot part of the liquor compared with that of the original extract gave the amount of tannin. It was noticed that catechin although not precipitated by gelatine is absorbed by the surface of hide. It is somewhat misleading to regard the tannin recorded in the above tables as pure as in several cases they include some, if not all, of the catechin.

The catechin was estimated by powdering a weighed quantity of the cutch with pumice and digesting in acetic ether for twenty-four hours. The extract was evaporated to dryness, a small quantity of hot water added and crystals left to form. After standing for one

CUTCH, CHEMISTRY OF.

Method of analysis.

or two hours the crystals were collected on a filter, washed and weighed. This method adopted by Greshoff in estimating gambier gave excellent results when only one or two per cent. of catechin was present, and ensured the minimum amount of decomposition.

The organic matter insoluble in hot water, the ash and moisture were determined in the usual way. The figures for non-tanning soluble matter were calculated by difference.

Variation in amount of 1. Tannin, 2. Catechin, 3. Mineral, matter.

As might be expected there is a greater variation in the composition of samples obtained from different sources in India than there is in trade samples of cutch imported into England. The tannin in these tables ranges from 14·1 to 54·8 per cent., and the catechin from nothing to 40·8. The lower valuations are due to the impurities present either added through carelessness or fraud or to improper manufacture. When the mineral matter constitutes one quarter, one third and one half of the extract, there is evident adulteration, and such extracts can have little value, either as a dye, a medicine or a masticatory.

Ratio of tannic acid to catechin.

There is no rule respecting the relation between the tannic acid and catechin. In the Burma samples there is an average ratio of 9:1, while in the Indian samples the ratio extends from 1:1 in the Kumaun samples to 28:1 in a Rangoon cutch. The variations that may be expected in manufacture may be conveniently studied in observing the composition of the "Catechu-tannic acid" and "Catechin" (9065, 9066), prepared by separating the crystalline and non-crystalline portions of a batch of ordinary Oudh cutch.

There is a remarkable similarity of composition in ten of these samples, where a rather high amount of catechin is associated with a low amount of tannin. These include specimens from Surat and Nasik in Bombay, the Janakpuri cutches, Bahraich in the United Provinces, the Central Provinces, Palamau in Bengal, Tezpur in Assam and the Shan States in Burma. Although so widely distributed they exhibit an average of 37 per cent. of tannin and 15 per cent. of catechin or a ratio of 2·4:1. They hold therefore an intermediate position between the ordinary commercial cutch of Burma and the crystalline cutch of Kumaon and are probably yielded by the trees botanically referred to as **A. Catechu** and **A. Sundra**.

Mucilage.

Under the head of "non-tanning soluble matter" must be included mucilage or gum of the arabin class. This was detected by examining the residue left after exhausting the cutch with alcohol. The residue soluble in water was precipitated with alcohol two or three times until free from colouring matter, when it gave the reactions for gum arabic with the usual tests.

In some samples of cutch giving much non-tanning matter caramelised products due to decomposition of the tannic acid were regarded as the ingredients.

Sugar.

Allen records the presence of 0·5 per cent. of sugar in a sample of cutch. In one of the Janakpuri specimens I obtained as much as 1·2 per cent.

CUTCH, ADULTERATION OF.

Adulterants of cutch.—In dealing with the composition of cutch it is necessary to allude to the various substances which are occasionally added to adulterate it. Mr. Branthwaite of the Forest Department mentions the decoction of the bark or wood of the following trees which are sometimes used in Burma to mix with it. (*Indian Forester*, 1892.) *Than* (**Terminalia Oliveri**), *taukkyan* (**Terminalia tomentosa**), *lein* (**Terminalia bialata**), *hyangah* (**Terminalia Chebula**), and to a less extent *pyinkado* (**Xylia dolabriformis**) and *pyinma* (**Lagerstrœmia Flos-regina**). Also *ngabo* (**Odina Woodier**), according to Mr. Corbet. All of these barks are more or less astringent and according to our present knowledge would be considered substitutes rather than useless adulterants of a tannin extract. For instance, the extract of the bark of **Terminalia Oliveri** has been shown to be very rich in tannin. Professor Dunstan obtained 68·27 per cent. of tannin in the dried extract, and Professor Proctor of Leeds found the tannin to agree in its reactions with that from the wood of **Acacia Catechu.** Professor Hummel, however, reported that the colouring matter was inferior and when submitted to the test of calico printing it gave very poor results. It is, therefore, more suitable as a tan than a dye. Where the tree is plentiful along the Irrawaddi below Zigyang, the fishermen employ the extract to colour their nets.

By mixing barks.

Re-melting in Rangoon.

Chinese brokers in Rangoon who have nearly all the trade in their hands, do not own to this adulteration, but they confess that they re-melt soft cutch, mixing it with hard cutch, and re-pack it in boxes. This is probably the time at which adulteration takes place, as it is extremely easy to incorporate all manner of impurities into a soft black extract. It has been reported that for three years an individual in Burma carried on a lucrative trade by purchasing pure cutch in the district and boiling it up again with 25 per cent. of godown sweepings. This was said to fetch as high a rate in the home market as the best cutch shipped from Burma.

Rubbish mixed in.

Allen states that cutch is not infrequently adulterated with starch, sand and blood among other materials, and Jessart reports that he has met with an admixture of 60 to 70 per cent. of ferrous carbonate. The *sálpatawala* cutch, however, contains red earth as a recognised ingredient.

In the foregoing tables of analyses a large amount of mineral matter preponderates in a few of the specimens. In the Indian samples 6 in the 24 or 25 per cent. would be rejected for this reason alone, but in the Burmese samples only 3 in 34 or 8·8 per cent. were unduly loaded with ashes.

Tests.

To test for adulterants.

A very simple test, besides the estimation of tannin and catechin, is the solubility of catechu in 90 per cent. alcohol. This is readily performed by digesting one or two grams of the finely

CUTCH, ADULTERATION OF.

To test for it.

powdered drug with occasional shaking for 24 hours. The solution is then filtered, the marc washed till free from colour, and the whole extract evaporated to complete dryness at 100° C. In glancing through the tables of analyses it is observed that the average dried alcoholic extract is 70 per cent.: some fair samples of cutch yield between 60 and 70 per cent., while those of undoubted inferiority contain less than 50 per cent.

In the German Pharmacopœia the above test is directed to be applied in a different manner. It requires that the residue remaining after extracting catechu with alcohol should not exceed 15 per cent. This figure, allowing for 15 per cent. of moisture, is equivalent to 70 per cent. of dried extract. But K. Dieterich, in 1901, pointed out that this requirement is too stringent, and recommended 30 per cent. as the limit of insoluble residue. He discovered that the residue from six samples of Pegu catechu varied from 25·71 to 41·86 per cent. His opinion therefore was that catechu conforming to the present official requirement was rarely found in the market.

In the light of the examination of over sixty samples of Indian catechu it is clear that the limitation of the Indian and Colonial Addendum of the British Pharmacopœia, *viz.*, 80 per cent. of extract, is too high, and that these figures might be altered to "between 60 and 70 per cent."

With regard to the ash limit of catechu the Indian and Colonial Addendum fixes the maximum at 6 per cent. and the United States Pharmacopœia at 5 per cent. Since the average percentage of the ash of a large number of samples of Burmese cutch was found to be only 2·9, there should be no difficulty in obtaining commercial cutch with less than 5 per cent. of mineral matter.

CATECHU VERSUS GAMBIER. Chemical differences.

The relation between catechu and gambier.—So far we have been dealing with catechu or cutch, an astringent extract made from the wood of **Acacia Catechu**. In the Malay States and Borneo there is manufactured an extract from a plant called **Uncaria Gambir**. This has similar properties, and it has often been reported that the chemical composition of the two substances is identical as they both contain tannic acid and the crystalline principle catechin. The catechins separated from these two plants were for many years considered the same, but A. G. Perkin (*Journal of the Chemical Society*, XXIII., 1904, 746), after studying their derivatives, has observed certain differences. He points out that gambier catechu contains a catechin $C_{15}H_{14}O_6$, melting at 175°—177°, the pentabenzoyl derivative of which melts at 151°—153°, while the catechin of **Acacia Catechu** $C_{15}H_{14}O_6$, melting at 204°—205° gives a benzoyl compound melting at 181°—183°. Notwithstanding these minor differences the researches of Perkin and Yoshitake, and Kostanacki Tambir and Krembs show that there is an extremely close chemical relationship between the catechins derived from different sources. Attention should be drawn to the interesting fact in vegetable physiology that the extract of the wood of a leguminous

CATECHU VERSUS GAMBIER.

tree has such a remarkable resemblance to the extract made from the twigs of a rubiaceous shrub.

Analyses of Gambier.

Analyses of gambier according to Proctor shew a tannin content of 36 to 40 per cent. Allen records a percentage of 47·18. M. Greshoff, Haarlem, has recently (1905) given the following results of an analysis of an unadulterated gambier: Tannin 24, crude catechin 46, crystalline catechin 30—35, insoluble 7·6, water about 15, ash not more than 5 per cent.

The following two analyses are given of pale cube gambier as sold in Indian bazars, and they are comparable with the tables of analyses of cutch given on page 41 :—

	Water.	Tannin.	Catechin.	Non. tan. sol.	Insol.	Ash.	Alcoholic extract.
Calcutta . .	11·4	27·7	30·0	19·9	7·1	3·9	79·9
Bombay . .	13·5	32·4	18·2	22·9	9·4	3·7	77·4

They therefore approach in composition the Kumaon and Janakpuri cutches of Northern India.

To distinguish the two.

As a means of distinguishing between catechu and gambier, Dieterich in 1896 recommended the following fluorescent test: 3 grams of gambier are dissolved in 25 cc. normal caustic potash and 100 cc. of water, 50 cc. benzene (·700) are then added and the whole agitated in a separating funnel. On allowing it to stand the upper benzene layer shows a green fluorescence. **Acacia catechu** does not show this reaction.

Similar uses in the East.

Notwithstanding the minor differences between the two extracts as a practical manner, cutch and gambier are used for similar purposes in the arts and in medicine. Evidence of this is traced in the history of gambier manufacture in Malaya. For several years the Malayas used *cate* or cutch, the product of the Indian **A. Catechu,** to chew with betel nut, but this became too expensive and they had to resort to various substitutes. Before 1750 they discovered the way of making cakes of the extract of the gambier plant, and this extract has now almost entirely displaced Indian cutch in the Straits Settlements and elsewhere in the Far East.

In the Calcutta bazars Janakpuri khair (cutch) and *papri khair* (gambier) are sold side by side in all the grocers and druggists' shops. The first is somewhat darker and is considered more bitter than the imported gambier, and the retail price is somewhat higher. The preference which is shown for one kind would seem to be merely a matter of taste for the consumer and a question of cost for the buyer.

Prepared catechin.

Catechin is sometimes prepared locally from cutch and gambier for edible purposes mixed with betel nut. In Calcutta the moist crystals are sold as *gala khair*. This is prepared by taking two parts of Papri and one part of Janakpuri, boiling them in water and straining through a cloth when cold. The residue on the cloth, after pressing, is kept for sale. The eaters of *pán* thus sometimes prefer an article almost entirely free from tannic acid.

Catechu in medicine.

CATECHU VERSUS GAMBIER.

Catechu from **Acacia Catechu** was recognised as an official drug in the London Pharmacopœia of 1721. The first British Pharmacopœia of 1864 included both catechu and gambier, the former being called **Catechu nigrum** and the latter **Catechu pallidum**. The inclusion of the two drugs was considered unsatisfactory as pharmacists were left to use whichever they pleased in making the infusion, tincture and compound powder. Professor Bentley pointed out that the infusion and tincture would vary, especially in colour, according to the kind of catechu employed, and this would lead the patient to the belief that his medicines had been wrongly prepared. With deference to this opinion Black catechu was discarded in subsequent editions of the British Pharmacopœia, and the Pale catechu was retained. In the Pharmacopœia of India, 1868, Black catechu is described and is prescribed for the preparation of the infusion, tincture and compound powder. In this work Pale catechu is described to be used for making catechu lozenges and is said to possess the advantage of being more soluble than Black catechu though the properties are similar. In the Indian and Colonial Addendum (1900) to the British Pharmacopœia, Black catechu or **Catechu nigrum** is again promoted to an official position and is directed to be employed in making all the preparations.

In medicine.

In the United States, Black catechu until recently has been preferred to Pale catechu. In the 16th edition (1889) of the Dispensatory of the United States the extract of the heart-wood of **Acacia Catechu** is referred to as "proper catechu," and gambier is placed among the catechus not recognised by the United States Pharmacopœia. The editor then proceeds to describe in detail the varieties of the official catechus to be found in the market of Philadelphia and designated as Plano-convex catechu or cake catechu, Pegu catechu, catechu in quadrangular cakes, Pale catechu and catechu in balls.

In the United States Pharmacopœia for 1900 gambier, or as it is called gambir, replaces catechu of the Pharmacopœia of 1890. The authors of the National Standard Dispensatory state that catechu is official in nearly all pharmacopœias though all do not agree in specifying this substance. The name catechu is retained for it. In America we are informed that very little catechu from **Acacia Catechu** is now to be found in the market, showing that an entire change of opinion with regard to Black cutch has established itself.

Areca Catechu.

EXTRACT OF ARECA-NUTS.

Former writers on Indian cutch have occasionally referred to an extract made from the nuts of **Areca Catechu** and used as a masticatory, but there is very little evidence to show that this extract

EXTRACT OF ARECA-NUTS.

is a marketable article at the present time. Ainslie (*Materia Medica*, Vol. I., 65) describes two substances said to be prepared from the betelnut palm: the first was of a light brown colour called *cutta-camboo* and brought from Pegu, the second was of inferior quality, almost black in colour, called *cushcuttie* and imported from Acheen. These were no doubt confounded with Pegu cutch and gambier. B. Heyne (*Tracts Historical and Statistical on India*, 1814) gives a circumstantial description of the manufacture of an extract from **Areca Catechu** in Mysore. Two products were obtained, one with a yellowish-brown colour and earthy fracture and the other, called *kassu*, of a black colour and mixed with impurities. Pereira (Vol. II., Part II., 341) gives Heyne's account of the origin of *kassu* and speaks of it as a product of Ceylon. In a letter from an Assistant Surgeon in Colombo in the year 1838, *kassu* is more properly supposed to be derived from **Acacia Catechu** and produced in India. Mohideen Sheriff made an unfounded assertion when he suggested that the cutch of South India was made from areca nuts. On the other hand, Blume who had a wider experience denies (*Rumphia* II., 67) that an extract such as catechu is procured from the nuts. Baden-Powell in "Punjab Products" alludes to an extract called *kossa* made from areca, and it is said that a sticky extract used for varnishing wood is sometimes prepared in Bombay, but there is no definite information now existing regarding the manufacture.

Made in Mysore.

Made in the Punjab.

There is no doubt that in former times much confusion existed with regard to the so-called extract of areca, and among some the confusion still exists. About a year ago a sample of cutch labelled **Areca Catechu** was sent from Madras to the Reporter on Economic Products for valuation, and from its appearance and composition, especially in its yield of catechin, it possessed all the characters of cutch from Burma. From other descriptions of cutch sold in Madras, it appears that Burmese cutch is now largely supplied in the shops.

Burmese cutch in Madras.

A sample of extract of **Areca Catechu** in the Indian Museum, designated as *Pakku*, was obtained from Trivandrum, Travancore. It has the dark-brown appearance of ordinary cutch, affords 40 per cent. of tannin, but no catechin, and yields only 49·2 per cent. of alcoholic extract. It, therefore, differed in some respects from ordinary cutch, and its origin is being enquired into. It seems highly improbable that these nuts could be used for the purpose of making an extract, considering the price of betelnuts in the market, and the demand that always exists for them in the raw and prepared state. They are habitually eaten with ordinary forms of cutch and gambier, and sometimes they are prepared by steeping them in a decoction of the cutch and allowed to dry, but at present we know little about the relative composition of the numerous trade samples of **areca**, and the whole subject is worthy of investigation.

Areca extract made in Madras.

Trade Statistics.

TRADE IN CUTCH.

A few references to the production and export of cutch and gambier will throw much light on the future of their respective markets. Gambier holds a firm position and is exported to double the extent of cutch, while the latter is falling off in production and trade with foreign countries.

Indian cutch is manufactured principally in Burma and about 97 per cent. of the exports from British India are shipped from Rangoon. During the years from 1869 to 1872 the following amounts were exported to the United Kingdom :—

1869	1870	1871	1872
2,257	5,252	4,335	5,240 tons.

In 1869-70, 10,782 tons were exported from Burma valued at £193,602. In 1872 the value of the cutch imported into the United Kingdom was estimated at £124,458. Statistics of more recent times show that for the five years ending 1895-96 the average exports from British India were 190,450 cwts. (9,522 tons), valued at R34,12,842 (£227,522 16*s.*). For the five years ending 1904-05 the average annual exports were reduced to 82,692 cwts. (4,139 tons), valued at R14,77,132 (£98,475 9*s.* 4*d.*). The price per hundredweight is R17-12 (£1 3*s.* 8*d.*). Last year the United Kingdom took one-half and France one-sixth of the exports, while Germany, the United States, Holland, China and Ceylon took smaller quantities.

Trade in Gambier.

The trade in gambier is much larger than that of cutch. This article has been exported from Singapore for several years. In 1839 we find that over 5,000 tons were sent to England from this port. In 1872 the imports into England reached 21,000 tons valued at £451,737. Singapore exported in 1871 no less than 34,248 tons of gambier. In 1876 the amount rose to 50,000 tons, and in 1877 it fell to 39,000 tons. Recent statistics show that in 1903, 32,083 tons of block and 2,823 tons of cube gambier were sold at Singapore. In 1904, 22,246 tons of block and 2,563 tons of cube were sold and in 1905, 29,921 tons of block and 3,445 tons of cube. About 1,300 tons of gambier from the Straits is imported annually into India, chiefly at Calcutta, at R17-8 (£1 3*s.* 4*d.*) per cwt. or R356 (£23 14*s.* 8*d.*) per ton. This amount is almost entirely consumed in the country.

Conclusions.

CONCLUSIONS.

The foregoing notes deal with two products differing in botanical and geographical origin, yet having in many respects similar properties. They have long enjoyed a reputation in medicine and have rivalled one another in their claims for admission into the Pharmacopœias of western nations; the pale catechu or gambier is, however, now taking the lead as the favourite drug.

CONCLUSIONS.

The reasons for this are not far to seek. The khair tree (**Acacia catechu**) occupies reserved areas under the Forest Department in two or three centres in Burma, Kumaon in Northern India, and perhaps Bombay, and the manufacture is restricted owing to the limited number of trees available for felling. On the other hand, gambier is obtained from a crop the cultivation of which can be readily extended as the demand for the manufactured article increases, and the uniformity of composition and greater outturn of the product appeal favourably to purchasers. Indian cutch, especially that of Burma, has a standard of its own, and will continue to command a market on account of the high quality of the extract in tannin. By a system of natural reproduction in the forests in localities indicated in the above notes, and by careful attention to the manufacture, cutch of India should long remain a rival of the gambier of the Straits in dyeing and tanning industries and in medicine.

G. I. C. P. O.—No. 719 R. E. P.—21-9-1906.—2,500.—L. J. D.

(Vegetable Product Series, No. 96.)

THE

AGRICULTURAL LEDGER.

1906—No. 4.

—o—

PSOPHOCARPUS TETRAGONOLOBUS.

(GOA BEAN.)

GOA BEANS IN INDIA.

By I. H. BURKILL, *Officiating Reporter on Economic Products to the Government of India.*

THE GENUS PSOPHOCARPUS.

Its useful species.

In the genus **Psophocarpus,** Agriculture or Horticulture finds two serviceable plants; the one is **Psophocarpus palustris,** a plant widely cultivated in Africa and introduced into South America; the other is **Psophocarpus tetragonolobus,** which is cultivated from Mauritius to New Guinea. Possibly the whole genus is to be reduced to these two widely grown beans, which differ thus:—

Flowers on short stalklets, several—**P. palustris.**
Flowers on long stalklets, few, larger—**P. tetragonolobus.**

Both have been grown in India, but **P. palustris** is not grown now.

First report on P. tetragonolobus.

P. tetragonolobus was the first of the two to come to European knowledge. Rumpf who lived in Amboyna from 1653 to 1702, drew it and described it. "This Phaseolus gives" he says (Herbarii Amboinensis liber ix., cap. xxi., Amsterdam 1750; tab. cxxxiii.): "tuberous roots as well as edible beans. ... Its flowers are the largest of all the Phaseoli ... within pale blue, without dun-coloured: they are few and only open before midday, and do not produce much fruit. ... The beans are quadrangular, about a hand-span long, or sometimes a foot long, hardly a finger-breadth broad, with membranous frilled wings at the margins, pale green at first—then smoke-colour and hard. When old the pods have narrowed wings, quadrate, and at maturity they open in the sun with much crackling. ... The root ... has the form of an oblong

HISTORY OF PSOPHOCARPUS.

turnip. In Latin the plant is called Lobus quadrangularis, in Malay and the Javan language *Botor*, ... in the language of Banda *Culebet*, in that of Bali *Caloncan*. Botor is derived from the Arabian Batr which means a lobe ... The bean is produced in Amboyna and elsewhere apparently, in Java and Baleya, but is rarely cultivated.

"Its tender green pods, before they harden into the beans, are cooked, cut into short segments, like other such beans. ... The ripe beans can hardly be eaten, as they are said to make the head heavy. ... The root is eaten boiled and for the purpose is dug before the bean ripens, after which it is less pulpy and dry."

Linnaeus' name.

Rumpf's plant, which is figured, is undoubtedly **Psophocarpus tetragonolobus.** Linnaeus, when he came to range and catalogue all things known to have life, called it **Dolichos tetragonolobus.** Necker, who still had no more information than old Rumpf afforded, in 1790 changed the name to **Psophocarpus tetragonolobus,** which name we now adopt.

Origin of accepted name.

First record for China.

In 1790 Loureiro stated that it is grown in South China. It is not unlikely that he meant the neighbourhood of Canton. (*Flora Cochinchinensis*, p. 437.)

First records for India.

In 1799 according to Roxburgh it was introduced into the then twelve-years-old Botanic Garden of Shibpur, Calcutta, and it continued to be grown there for the Superintendent's table for some time (*vide* Roxburgh's *Hortus Bengalensis*, 1814, p. 55). Roxburgh did not know the native country of the bean, a circumstance which indicates surely that it had been grown in India before his time. Most likely Roxburgh obtained his seed in the first instance from local sources. It can also be proved to have been in cultivation at Madras about this time; for Wallich, who in 1828, distributed herbarium specimens from the Calcutta Botanic Gardens collected by Buchanan-Hamilton (in charge 1814-15) and by himself, also distributed specimens collected for him from Madras.

First record for Reunion.

In 1820 **Psophocarpus tetragonolobus** was in cultivation in the French island of Réunion (Breon, *Catalogue des plantes cultivées aux jardins botanique et de naturalisation de l'ile Bourbon*, p. 51). Breon did not know its origin; and this indicates that it had been in Réunion before the foundation of an experimental garden there. Had Breon received it from the Calcutta gardens, with which an exchange had been established, it would have been acknowledged.

Found in Burma.

In 1826 Wallich found the plant to be cultivated (or run wild) in Lower Burma.

In 1825 Seringe, who wrote the account of the pea-family in DeCandolle's Prodromus, described Rumpf's plant, and remarked that Du Petit-Thouars had obtained a similar, but smaller plant from stream sides in Madagascar. This remark would seem to be the first mention of **Psophocarpus palustris.**

First mention of P. palustris.

HISTORY OF PSOPHOCARPUS.

In 1826 Desvaux, stimulated by the work of Seringe to publish his observations on Leguminosæ, described **Psophocarpus palustris** from damp places in Senegal, West Africa, (*Annales des Sciences Naturelles*, Series i, ix, p. 420). The same plant was again described by Guillemin, Perottet and Richard in 1830 as **Psophocarpus palmettorum** (*Floræ Senegambiæ Tentamen*, p. 222) from specimens which they had obtained climbing up palm stems near Cape Verde, West Africa.

Second mention.

Third mention.

Mention has been made of Wallich's distribution in 1828 on behalf of the East India Company of the large herbarium then formed. Graham, the Professor of Botany at Glasgow, named Wallich's Leguminosæ and found both **Psophocarpus tetragonolobus** and **Psophocarpus palustris** among the specimens; but he did not at first recognise either, and named the one **Dolichos ovatus** and the other **Dolichos suffultus. Dolichos ovatus** was, however, almost immediately recognised to be **Psophocarpus tetragonolobus.**

Wallich had both species from India.

Graham did not recognise them.

The first important work after this date is Roxburgh's *Flora Indica*, in which (iii. 1832, p. 305) he contents himself by saying "**Psophocarpus tetragonolobus** is reared in gardens for the table, where indigenous I cannot say: ... we have an herbaceous variety from Pegu with esculent roots." It is astonishing that he does not give any vernacular name for the plant, as though he had not known one. In 1834 Arnott and Wight's *Prodromus Floræ Peninsulæ Indiæ Orientalis* was published. They describe the plant which was evidently familiar (to Wight at least) from gardens at Madras, but without giving any other information. In Graham's catalogue of the plants of Bombay, published after his death at Khandala in 1839, **Psophocarpus tetragonolobus** is said to be "cultivated in gardens and used like French beans" in the Bombay Presidency—"a native of Mauritius." It is impossible to find out if Graham had any evidence before him when he said that the plant had come from Mauritius. He gives no vernacular name.

Indian references 1832—1839.

In 1837 Blanco (*Flora de Filipinas*, p. 576) wrote that the plant is grown round Manilla and eaten.

In the Philippines 1837.

The first Indian vernacular name recorded is "Charakoni-Sem"—the familiar Bengali name:—it was recorded in 1845 in Voigt's *Catalogue of the Plants cultivated at Serampore and Shibpur.* Voigt runs wide of the mark when he suggests South America as its original home.

In 1842 Hasskarl studied these beans in Java. His work (*Flora*, xxv., *Beiblätter*, p. 75) is a new landmark. He found in Java that there were present both **P. tetragonolobus** and **P. palustris**, and that the latter had two varieties. But **Psophocarpus palustris** was not recognised by him as a

Hasskarl's account of the forms found in Java.

HISTORY OF PSOPHOCARPUS.

Forms found in Java.

described plant and consequently got the new name of **Psophocarpus longepedunculatus.** It, he records, was called by the natives "Djaat monjet" (monkey djaat); while the two varieties of **P. tetragonolobus** were called respectively "Djaat" and "Djaat Pütoi" (Parkia-like Djaat, because its pods were thought to be like those of the Parkia tree). Djaat is the long podded **Psophocarpus tetragonolobus:** Djaat Pütoi is narrow winged, hence Hasskarl's name of *var.* **micropterus.** He brought all into cultivation in the Buitenzorg gardens (*vide* his *Tweede Catalogus der in 'slands Plantentuin te Buitenzorg gekweekte gewassen*, Batavia, 1844, p. 281).

Hasskarl wrote of the variability in colour of the seeds in his *Plantæ Javanicæ Raroires*, 1848, p. 388.

Miquel's account in 1855 (*Flora van Nederlandsch Indie*, i, p. 181) is only a putting together of Rumpf's and Hasskarl's accounts.

The name Djaat Pütoi appears in Teijsmann and Binnendijk's Catalogue of the plants grown at Buitenzorg (*Catalogus plantarum quae in Horto Botanico Bogoriensi coluntur*, Batavia, 1866, p. 263) as Djaät peteui; and of both Djaat and djaat peteui we have three races named which differ in the colour of the seeds.

Djaat poetie—white seeds.
Djaat ietam—black seeds.
Djaat koenieng—yellow seeds.
Djaat peteui poetie—white seeds.
Djaat peteui ietan—black seeds.
Djaat peteui koenieng—yellow seeds.

Further confusion in names of P. palustris.

That most unfortunate plant **Psophocarpus palustris,** already with four names, obtained a fifth in 1858—**P. Mabala**—from the African traveller Welwitsch (*Apontamentos sobre a Flora de Angola*, p. 589) and later it seems again to have obtained another in **Psophocarpus comorensis** (Pierre in *Bulletin de la Société Linnéenne de Paris*, i, 1883, p. 380, and in Grandidier, *Histoire physique, naturelle et politique de Madagascar*, ii, 1886, plate 34). We can now dismiss it with a few further remarks. It has been found to be cultivated very widely in Tropical Africa. Welwitsch found it generally cultivated in Angola at a little distance from the coast, its seeds eaten fried in oil under the name of "Mabala" (*Hiern, Catalogue of the African Plants collected by F. Welwitsch*, i, 1896, p. 26): Speke and Grant found it in Mozambique; Sir John Kirk found it on the Zambesi; others have found it in Calabar, at Nupe, and on the Congo (*vide* Baker in *Oliver's Flora of Trop. Africa*, ii, 1871, p. 208). Baron says (*Journ. Linn. Soc. Bot.* xxv., 1889, p. 261) that it is common in both East and West Madagascar. Bentham in *Martius, Flora Brasiliensis*, xv, pt. i, 1859-62, p. 197, plate 52) shows that the plant has been taken to South America where it has long been established near the port of Bahia. Ito

Final remarks regarding P. palustris.

(*Tentamen Floræ Lutchuensis*) says that it is cultivated in the Luchu Islands.

DISTRIBUTION OF P. TETRAGONOLOBUS.

Possibly it is a native of Madagascar carried thence westwards through Africa and to South America and eastwards to Malaya, but the evidence is slender as far as it goes at present, and the less said the better.

We have seen that it was once tried in Calcutta, but did not persist.

Psophocarpus tetragonolobus, the plant that we are more nearly concerned with, is not to be found on the continent of Africa. We have seen that before 1850 it had been noted to be in Réunion, India with Burma, Java and the neighbouring islands of Bali and Banda, also in the Philippines and Amboyna. Since 1850 it has been shown to occur in Mauritius, towards the western end of its distribution (Baker, *Flora of the Mauritius*, 1877, p. 79), and in New Guinea at the eastern (K. Schumann, *Flora von Kaiser Wilhelms Land*, p. 99; Schumann und Lauterbach, *Flora Deutsch Schützgebeit*, 1901, p. 372; Warburg, *Pflanzenkleid und Nutzpflanzen Neu Guineas*, 1899, p. 65). Safford records it from Guam 1,200 miles east of the Philippines, and peopled by a stock of Philippine origin. (Useful plants of Guam in *Contributions from the United States National Herbarium*, ix., 1905, p. 281.)

Usteri (*Beobachtungen über tropische Märkte*, 1905, p. 419) says that the bean is found in the markets of Java.

In 1862 Sir George Birdwood (*Catalogue of the Economic Products of Bombay*, p. 123) mentioned the plant as a Bombay product, fixing wrongly its home as Sicily upon an incorrect identification. He gives the Bombay names as Chandaree, and Charputtee, and the Cinghalese name as Dara-Dambala. Lisboa in volume xxv. of the Bombay Gazetteer, names the plant as Chowdari or Chevaux de frize of the French, describes it, and says loosely that "it is cultivated through Bombay and India."

WHERE GROWN IN INDIA.

As **Psophocarpus tetragonolobus** likes a considerable quantity of moisture it is most abundant in the damper parts of India. From the Panjáb it is almost absent, if not quite so. In the United Provinces it can only be got to ripen seed with some difficulty. The late Mr. William Gollan informed me that at Saharanpur it would make good growth during the rains, but would hardly bear more than a pod or two, and that it was lost to his garden some 15 years ago by not seeding.

United Provinces.

In the Central Provinces and Berar it is a little more at home, and can be found, but very rarely, in the village gardens. Sir George Watt collected it at Anjangaon in Berar in December 1894, and noted that it was only grown in a few villages. A little later Mr. F. G. Sly, Commissioner of Settlements, Central Provinces, who had it cultivated in the Government Garden, Nagpur, distributed it to the villages near

Deccan plateau.

PSOPHOCARPUS, WHERE GROWN IN INDIA.

Nagpur, and in 1903 its cultivation had extended beyond the district of Nagpur. In other parts of the Deccan plateau it is grown freely, as at Poona where large quantities come into the market and where with irrigation it is made to produce pods in the height of the hot weather (*vide* Woodrow, *Gardening in India*, ed. 3, 1899, p. 267). In Mysore according to information kindly supplied by Mr. J. Cameron, it is largely cultivated.

Bombay.

Under the Western Ghats the plant is abundant. Mr. R. P. Mehta, formerly Deputy Director of Agriculture, Poona, informed me that it is not uncommon in Gujarat. It is common in the Bombay market being grown near Bombay. It is also common around Ratnagiri, and common near Goa.

Bengal.

On the Eastern side of India, it occurs not very frequently in Bengal, but commonly enough near Calcutta to be a well known vegetable. The seeds are regularly sold by some of the native seedsmen of the city and every now and then pods are offered for sale in the New Market. If grown at all in the valleys of Assam, the fact is unknown to me. It is grown at Chittagong (see Prain, *Bengal Plants*, 1903, p. 391).

Madras.

I have not seen it under the Eastern Ghats, nor obtained any information regarding it from districts north of Madras. About Madras it is cultivated.

Burma.

On the east coast of the Bay of Bengal it is to be found throughout Arakan. It is cultivated almost everywhere in Burma and very widely in the Shán States which supply the seed to Central Burma. Only in Burma it is a field crop: elsewhere it is always a garden crop.

The districts of Burma* in which the plant is most largely cultivated are:—Kyauksè, Mandalay, Meiktila, Yamèthin, Prome and Henzada. There is a very little of it in the Möng-mit Shán State which is administered as a division of the Ruby Mines District and a little in the Upper Chindwin Division and a little in Katha. In Hanthawaddy there is a little. In Tharrawaddy it is almost absent. Chinamen cultivate it on a small scale close to Rangoon. It is cultivated in tiny garden patches in Bassein. In Pegu it is found in gardens only. In Thatôn, it is more extensively grown by Karens on the banks of the Salween.

It is found in every village of the Hsipaw State (Northern Shán States) and on a fairly considerable scale in Hsumhsai Sub-State. In north and south Hsenwi it is fairly plentiful. It is grown in the large Kengtung State.

The sources of the seed supply in the Shán States are chiefly the villages of Kyauk-Khwet and Kywet-na-pa, near the borders of the

* The credit of getting together almost all the information that follows belongs to Mr. A. Gaitskell, I.C.S., formerly Director of Land Records and Agriculture, Burma.

PSOPHOCARPUS TETRAGONOLOBUS ITS NAMES.

Ye-Yaman tract of Kyauksè, and Nge-nin, also Maymyo which is in the Mandalay district though on the Shan plateau, Wetwun just east of Maymyo and Htilhaing in the Maw State (Myelat district, Southern Shán States).

Many of the names applied to **Psophocarpus** have an obvious meaning. I give them below as far as it is in my power :—

In Mauritius and Réunion : Pois Carré or Square pea.

In India.

Among the English, Goa bean.

Among the Portuguese at Goa, Fava de Cavallo or Horse Bean.

Bombay : Chandari (four winged).
Charputtee (four leaves).
Ghevda (meaning bean, at times meaning **Dolichos Lablab** only).

Bengal : Chara-koni-sem (four cornered bean).
Lakar-sem (stick bean).

Madras : Morisu-avarai (Mauritius Bean). *

Ceylon : Dara-dambala (four winged bean).

Burma : Pe-saung-sa (bean like **Averrhoa Carambola**).
Pe-myit (bean-root) is the root.

Karen hills : Kaw Bemya (Burmese bean).

Shan hills : Hto-pong (*i.e.*, the Pong-bean, pong may mean happy), the root being Ho-hto-pong.

In the Straits Settlements : Kachang Botol or Kachang Botor (Kachang means a bean, but Botol or Botor is not satisfactorily explained. The theory that Ridley quotes in Journ. Royal Asiatic Soc. Straits Branch, xxx., 1897, p. 114, that it comes from bottle is untenable ; Rumpf's speculation that it comes from the Arabic Batr seems far fetched).

In Java ; Botor Kachang and Djaät.

In Bali : Caloncan.

In Banka : Culibet.

In Amboyna : Botor.

In the Philippines and Guam ; Sequidillas, Camaluson, Calamismis, Pallam or Pallang.

No Indian names are old.

The evidence of language is against the bean being native anywhere within the Indian Empire. For none of the names given to it except Hto-pong (Shán) have any impress of age ; they are all

* Achard in his *1,500 Plantes d'Inde*, 1905, p. 366, says that the Pondicherry name is Mouroukouavarecody, which Mr. C. A. Barber assures me must be due to some misconception. The termination cody means 'climber.' The rest is Morisu-avarai misunderstood, or else Murukku avarai meaning 'crisped bean.'

ORIGIN OF PSOPHOCARPUS TETRAGONOLOBUS.

uncorrupted expressions of the modern language in which they are used. That it should be found wild in Burma proves nothing; for when wild it is certainly an escape from cultivation.

If it be agreed that the plant is not Indian, then how did it reach India? Possibly by two ways (1) through Goa from Mauritius or more likely from Rodriguez, the island near Mauritius of which the Portuguese made much use; and (2) almost certainly from the Malay Islands by the Malay Peninsula just as Manioc did (see *the Agricultural Ledger* No. 10 of 1904, p. 124). Economic products establish themselves in new countries more easily than their names: the Goa bean lost its Malayan names on reaching Burma and became the pea like a *Carambola* and the pea with a tuberous root, names which, however, it took with it to Arakan, where the long cultivated plants do not generally pass by common Burmese names. The Karens call it simply Burmese bean. Only the Sháns apply to it a name hard to explain.

Certainly not Indian.

Now the Sháns say that it came from Burma and the Burmese sometimes say that it came from the Sháns; but it is perfectly certain that neither the one nor the other know whence it came to their country. Possibly its field cultivation is more recent than its introduction into the country.

One may freely speculate as to whether **Psophocarpus** reached Mauritius or Rodriguez from Malaya, or Malaya from Mauritius or Rodriguez. There is only one point known to me that is useful for evidence, and that point is in the very probable African or Mascarene origin of **Psophocarpus palustris**. For if **Psophocarpus palustris** took its origin in Africa or the Mascarene islands or Madagascar, then probably the very similar **P. tetragonolobus** had an origin in the same part of the world.

Can it be Mascarene?

DESCRIPTION OF PLANT.

Psophocarpus tetragonolobus is an annual, of 8—9 months duration; after fruiting it dies. The tuberous root swells up very early; and when fruits are ripe it is already stringy and insipid.

The common plant in India has yellow-brown seeds. In Burma together with yellow-brown seeded plants, are white seeded plants. White seeded plants extend to Arakan but do not reach Bengal: I have also obtained white seeded plants from Hsipaw in the Shán States. Very dark brown seeds have been seen from Nagpur.

The Burmese distinguish two races, long podded and short podded. There is no great difference between them. The long podded in Burma is generally 6—8 inches long (Rumpf says that in Amboyna it may be a foot long), and the short podded in 4—5 inches long. Short podded specimens have been seen by me from Prome, in the Pegu bazaar and near the Sittang river at Minywa.

Cultivation.

CULTIVATION.

In the Shán States the seeds are planted in the beginning of June or when the rains begin, three inches deep in village gardens. Rich

CULTIVATION OF PSOPHOCARPUS TETRAGONOLOBUS.

wet soil is chosen, or if the soil is not very rich plentiful watering is resorted to. In some of the Southern Shán States such as Kentung, one finds two or three plants in the corner of a garden here and there. But in parts of the Northern Shán States the plants are much more plentifully sown. There they are to be seen in Taung-yas or forest clearings, generally where bonfires have been made round the dying trunk of a tree too large to have been cut out, *i.e.*, where the burning of rubbish, branch-wood, etc., has manured the soil. If the plant be sown in a garden, ridging is often resorted to.

Shan States.

The seedling is left to take care of itself as soon as established, having been provided with something up which to climb. It grows to 10—12 feet high. Sometimes the Sháns dig the root up and eat it, but more generally they leave it to produce beans which are gathered young except those intended to set seed. The crop is gathered in December and January. The tuber is said to be much larger than is produced in Burma.

The cultivator saves his own seed, but in the Hsum-hsai Sub-State, which is west of Hsipaw, the Sháns produce seed for sale to Burma; and so also is done in the near parts of the Maymyo sub-division of the Mandalay district. This seed produced is carried down to the plains and grown in the Central parts of Burma, and it sells in Kyauksè at ₹7-8 and sometimes ₹10 (10*s.* and 13*s.* 4*d.*) per basket ($1\frac{1}{8}$ bushel) or double the price of local seed. Through the Director of Land Records and Agriculture, Burma, I have received the following interesting information got together by Mg. Shwe Zan Aung, Superintendent of Land Records, Kyauksè :—

Kyaukse.

"While much of the quality depends upon the care bestowed on the selection of seeds the difference between plants grown from Shán seed and locally saved seed may still further be ascribed to the fact that in spite of the more abundant rainfall in the Shán States the hilly country is not exactly waterlogged as the plains are; for it will be noticed later on that the excess of moisture in the ground materially affects the yield.

Causes of variation.

"This is the reason why the fields slightly higher than the rest in a holding have been selected with better results than the low grounds.

"Goa-beans thrive very well on clayey soils or non-myenu, but the tubers are too big to be prized by the people. Sandy loam or sane-mye is said to be best suited for the cultivation. The crop has also been known to grow on clayey loam or phutchai-mye.

Soils.

"About the months of May or June (*i.e.*, Kason or Nayon) water is let onto the selected fields from the irrigation channels and the land is lengthwise, crosswise and diagonally ploughed.

Ploughing.

"In July or August (Waso or Wagaung) as the case may be, the land is harrowed and hoed into furrows, between which ridges or "baungs" 2 feet broad and 1 foot high are prepared with a spade, $1\frac{1}{2}$ feet apart in order not only to admit air and water freely and to drain off water effectively.

Harrowing and hoeing.

CULTIVATION OF PSOPHOCARPUS TETRAGONOLOBUS.

"Then the seeds are buried in small holes, about 3 by 6 inches apart, specially prepared for the purpose on the ridges.

Sowing.

"Two baskets of seeds go to an acre. If the local seeds popularly styled "Pegale" (little bean) in contradistinction to "Pegyi" (large bean) the parent seed, be used, the operations are generally a month later.

Irrigation.

"Immediately after sowing, the field is flooded from the Irrigation channels, but the water is withdrawn at once.

"The land is again subjected to alternate flood and drainage until the harvest. It is done at least three times every two months or according to the amount of the rain-fall.

"Great care should be taken not to allow the water to remain long on the fields except when the plants have flowered or fruited, for as stated elsewhere, the excess of moisture tends to reduce the number of tubers.

Weeding.

"Weeds are periodically removed—say twice or thrice during the season as the case requires—chiefly by women who are paid at 2 annas each with free meals provided by the cultivator for the day. The superfluous growth among the creepers has to be plucked out by hand. Thus the work of weeding is a tedious process and is expensive. Stakes are not used, the plants are left to lie along the ground. From January to March, *i.e.*, (Pyatho to Tabaung) when the land is fairly dry the tubers are dug up by men and gathered by women. Each labourer is paid either by the contract, or by daily wages when the out-turn is bad. The contract is 1 anna per 10 viss of tubers collected. The daily rate is Ro-6-0 (6*d.*) for each man and Ro-4-0 (4*d.*) for each woman.

"In either case in addition to these rates a bag or a load of tubers is appropriated by each labourer as his lawful wages. The digging operation serves a double purpose, 1st, for the harvest, 2ndly, as a preliminary loosening of the ground for the following crop, *viz.*, sugarcane in the Singaing township and early sesamum elsewhere.

Manuring.

"Farm-yard manure is known to have been used with advantage. Cart loads of cow-dung are scattered in small heaps and distributed by water at the time of ploughing.

Diseases of the crop.

"No insect pests are said to have injured the crop. But if not preceded by a crop especially paddy, *i.e.*, if grown on fallow land or virgin soil, the tubers become covered with excrescences. Although not exactly a disease, it is a failure from the popular point of view.

Average cost.

"The average cost per acre of the cultivation may be tabulated as follows:—

	R	*a.*	*p.*	
Ploughing	2	0	0	(2*s.* 8*d.*)
Harrowing	1	0	0	(1*s.* 4*d.*)
Preparing ridges	2	8	0	(3*s.* 4*d.*)
Weeding (twice)	8	12	0	(11*s.* 8*d.*)
Cost of seed	14	0	0	(18*s.* 8*d.*)
Sowing	3	0	0	(4*s.*)
Harvesting	9	6	0	(12*s.* 6*d.*)
TOTAL	40	10	0	

add to this R2 (10s. 8d.) or R7 (9s. 4d.), the Government Revenue, including the water rate as the land is state or non-state. The above is a consolidated revenue of which R1-4 (1s. 8d.) in the case of state lands and R0-14 (1s. 2d.) in that of non-state lands have been fixed as land rents. The total outlay therefore amounts to R42-10-0 or R47-10 (64s. 10d. or 63s. 6d.). CULTIVATION OF PYCNO-CARPUS TETRAGONO-LOBUS.

"The average yield per acre is 1,500 viss (42 cwt. 99 lbs.) of tubers valued at R67-8 (90s.) at the wholesale price of R45 (60s.) per 1,000 viss (32 cwt. 66 lb.) and the net profit amounts to R13-4 or R18-4 (25s. 8d. or 24s. 4d.) per acre. Average outturn and value

"As with other crops, so with this there are 'middle men' popularly called "Ywe" who sell the tubers to 'Letka' at the retail price of R65 (86s. 8d.) per 1,000 viss (32 cwt. 66 lb.).

"The margin left to the *bond fide* cultivators after trouble and expenses would by itself not be encouraging, but the cultivators in Sagaing township generally grow a bumper crop of sugar-cane in the year after Goa-beans. It is said that the cane crop, if preceded by Goa-beans, yields half as much again as usual. Its relation to sugar-cane

"If any plants are left to seed, the young pods may be picked and used as a vegetable. No use is made of the ripe seed, unless it be that now and then in the Ye-Yaman tract, some mischievous person saves it and sends it up to the Shán hills for the purpose of adulterating good Shán seed, or it is locally sown for two generations yielding a less and less valuable crop each time. Pods and seed

"As far as can be ascertained there is no record of its introduction into the province."

Some time after the receipt of the above report, Mr. H. B. Powell, who had succeeded Mg. Shwe Zan Aung as Superintendent of Land Records, Kyaukse, supplied information that the area under the crop had undergone a slight decrease owing to want of water for irrigation, several irrigation works being under repair— Acreage.

1898	975 acres
1899	737 „
1900	807 „

As he anticipated the acreage rose again and was 2122 in 1901-02, though less again since.

Mr. T. C. Wilson, Settlement Commissioner and Director of Land Records and Agriculture, Burma, has kindly supplied to me the figures which may be found on p. 63.

The districts that adjoin Kyaukse are Mandalay, Sagaing, Myingyan and Meiktila.

In Mandalay the cultivation is apparently of more recent origin than in Kyaukse. The method and the cost is the same as in Kyaukse. The market for local produce as well as very much produced in Kyaukse is in Mandalay, where 100 viss (365 lbs.) sell for R10 (13s. 4d.) in December and less sums down to R5 (6s. 8d.) in Mandalay.

CULTIVATION OF PSOPHOCARPUS TETRAGONOLOBUS.

January; the immature pods sell in Mandalay at about R5 (6*s.* 8*d.*) per 100 viss (365 lbs.). Seed in Mandalay sells at R5 (6*s.* 8*d.*) per basket, and a basket of seed gives at the most 700 viss (22 cwt. 91 lb.) of roots or 1,400 viss (45 cwt. 70 lb.) per acre. Pe-myit is not grown in the district of Sagaing and Myingyan.

Meiktila.

In Meiktila there is not much cultivated: what little there is, is in the Nyaungyan circle. The outturn is about 600 viss (19 cwt. 62 lb.) per acre.

Yamethin.

South of Meiktila is the district of Yamethin where a small acreage has been grown on the border of a large swamp in the vicinity of Pyinmana, since 1878.

The seed is sown 2 inches apart on ridges 8—10 inches high and 12 inches apart, at the end of June or beginning of July, and the tubers are in the market in January and February.

Cost.

The cost of cultivation for an acre is as follows:—

	R	a.	p.	
Half basket of seed at R10 (13*s.* 4*d.*) per basket.	5	0	0	(6*s.* 8*d.*)
Making ridges	9	0	0	(12*s.*)
Weeding	1	4	0	(1*s.* 8*d.*)
Digging up of tubers . . .	16	0	0	(21*s.* 4*d.*)
Yearly interest on a yoke of plough cattle	1	12	0	(2*s.* 4*d.*)
TOTAL .	33	0	0	(44*s.*)

Yield.

The yield per acre varies from 800 to 1,200 viss (26 cwt. 8 lb. to 39 cwt. 12 lb.) of tubers.

It is cultivated chiefly for its tubers. Pods or beans are not allowed to go to seed, but are plucked when tender and sold as a vegetable: the value of tender beans per acre is about R7 (9*s.* 4*d.*).

Not being cultivated for its seed, it is not trained on sticks. Plants grow to a height of one foot and are allowed to creep or overhang the raised ridges on which they are grown.

The price of the tubers is R6 (8*s.*) per 100 viss (365 lb.).

The area under Goa bean cultivation in the district is insignificant.

Prome and neighbouring districts.

In the districts of Prome, Henzada, Hanthawaddy, and Tharrawaddy we have rather a different cultivation, for here the land periodically flooded by the river Irrawaddy is used; and we have also a little garden cultivation on soils not so sandy as the river soils. The tuber grows larger in the sandy than in the clay soils, but has not such a good flavour. The seed is sown on manured ground and is given bamboos to climb up. The crop is said to be dug in Henzada in November and December. Cultivation is estimated to cost R40 (53*s.* 4*d.*) per acre and the yield to be 1,200 viss (39 cwt. 12 lb.). The tubers sell at about R12-8 (16*s.* 8*d.*) per 100 viss (365 lb.). We find cultivation very similar to this in the Thatôn

Thatôn.

district, where the banks of the Salween are used, and traders dispose of the produce in Moulmein. The seed is there sown in small furrows 8 inches wide and 2 inches deep. It seems that in Thatôn certain islands in the Salween are allowed to produce seed for the local crop. CULTIVATION OF PSOPHOCARPUS TETRAGONOLOBUS.

In the north of Burma for Pe-myit we find garden cultivation and a little Taung-ya cultivation as in the Shan hills; also a very little about Katha on islands in the river Irrawaddy. Northern Burma.

In the Upper Chindwin district it is, for instance, always given sticks for support.

In Akyab it is grown a little on Taung yas or hill clearings. The same is apparently the case east of Chittagong. Arakan.

Extent of cultivation in Burma in acres.

	Mandalay.	Meiktila.	Kyauksè.	Yamethin.	Thatôn.
1897-98 . .	—	—	975	20	42
1898-99 . .	26	—	737	20	130
1899-00 . .	44	—	807	20	170
1900-01 . .	60	—	1,243	20	133
1901-02 . .	150	—	2,122	20	130
1902-03 . .	38	97	998	38	140
1903-04 . .	23	33	720	9	253
1904-05 . .	75	42	803	19	297
1905-06 . .	71	14	819	21	291

About Calcutta it is only to be found in gardens. I have grown it myself for several years sowing the seed early in the rains, and getting a crop of young beans in November and December. Bengal.

Over the rest of India it is grown in the same way; but Woodrow recommends sowing it on irrigated ground about Poona at the end of the rains in order to get a crop of young beans in the height of the hot weather when vegetables are scarce. (Woodrow, *Gardening in India*, 3rd Edn., 1899, p. 267.) Poona.

The root is eaten by Burmese between meal times as a delicacy; and there is an established standard size for it which sells according to season at 1 anna to ½ anna (1*d.* to ½*d.*). USES.

The trade in the roots is a large one, and they are sent in considerable quantities more than 200 miles by rail or river. Kyauksè supplies Bhamo on the north with large quantities through Mandalay and Pegu (almost certainly also Rangoon) on the south.

The root is eaten without cooking and is slightly sweet, firm like an apple and by no means unpleasant.

The unripe beans are mostly eaten locally and are not a large article of trade. They are inferior to French beans in flavour, but stand near them. I have myself eaten them many times.

PSOPHOCARPUS TETRAGONOLOBUS.

Dried roots from Kyauksé were found to have the following constituents (Hooper in *Report of the Indian Museum, Industrial Sections* for 1901-02, page 30) :—

Analysis of root.

Water	9·05
Oil	·98
Albuminoids	24·62
Carbohydrates (Starch and some sugar)	56·07
Fibre	5·38
Ash	3·90
TOTAL	100·00

The seed, not eaten in India, has the following composition (Hooper in *Report of the Indian Museum, Industrial Section* for 1902-03, page 26) :—

Analysis of seed.

Water	9·50
Oil	15·46
Albuminoids	37·43
Carbohydrates	28·38
Fibre	4·98
Ash	4·25
TOTAL	100·00
Containing Phosphoric acid	1·35
„ Nitrogen „	5·99

They are however eaten in Java, roasted in an iron pot until the shell cracks off.

In Kentung the root is said to be used as material for making a poultice for the head and neck in cases of vertigo.

PESTS.

Two fungus pests have been found on it in Java; the one Woroninella Psophocarpi described by Raciborski in Zeitschrift für Krankheiten, 1898, p. 98, the other an Uromyces described by Sydow in 1903.

G. I. C. P. O.—No. 1157 R. E. P. —30-11-06.—2,500—P. M. M.

(Vegetable Product Series, No. 97.)

THE

AGRICULTURAL LEDGER.

1906—No. 5.

COCHLOSPERMUM GOSSYPIUM.

(SEEDS & OIL.)

[*Dictionary of Economic Products, Vol. II.*, C. 1512-1519.]

A short Account of the seeds and oil of **Cochlospermum Gossypium**, *by* BABU SURENDRA NATH DEY, B.A., *Assistant in the Chemical Laboratory of the Indian Museum, Industrial Section.*

COCHLOSPERMUM GOSSYPIUM.

There are several trees in India which have again and again been suggested as sources of silk-cotton or 'kapok' cotton, now exported from Java in considerable quantities chiefly for upholstery purposes. In Java the tree yielding this material is **Eriodendron anfractuosum**,—a tree which is planted more for ornament than for use in Burma and on the West coast of India, but in India has never been exploited as a source of 'kapok' cotton. On the other hand, considerable effort has at various times been employed to introduce two other similar 'kapoks' to the trade, one obtained from **Bombax malabaricum**, a common tree throughout the country, and the other from **Cochlospermum Gossypium**, which occurs commonly in the drier parts of North India. This tree, according to Gamble, is characteristic of the hottest, driest, stoniest slopes, and it would obviously be of great value if its productions in the shape of silk cotton or of seeds or of both could be turned to account. The Reporter on Economic Products to the Government of India has lately issued, as *Commercial Circular* No. 2 of 1905, a report made by Professor Wyndham R. Dunstan on the relative value of the flos or silk cotton produced by this tree: in the present report it is proposed merely to give an account of the seeds and the oil produced from them.

Yields Kapok.

Up to the present, even in the districts where the tree occurs, little use has been made of the seeds. They have been used for food in Celebes (*Pharmacographia Indica, p. 151*) where they are roasted before being eaten. In India, however, no record seems to

Use of the seeds as food.

COCHLOSPERMUM GOSSYPIUM.

exist of their ever having been so employed. There seems, however, no reason why in cases of necessity they should not be used in this way.

The seeds themselves are kidney shaped or cochleate with a hard shell, about $\frac{1}{4}$ to $\frac{1}{16}$ inch long, about 400 going to one ounce. They have a pleasant sweetish somewhat almond-like flavour when tasted, followed by a slight bitterness which can hardly be called objectionable. On analysis they gave the following figures :—

Analysis of seeds.

	Per cent.
Moisture	9·25
Oil	14·25
* Albuminoids	20·94
Carbohydrates	35·78
Crude Fibre	14·63
† Ash	5·15
	100·00

	Per cent.
* Containing Nitrogen	3·35
† Containing Phosphoric Acid	0·96

The seeds contained no alkaloids, and were free from tannin. Very small traces of starch were found. A non-reducing sugar of the saccharose type was present in some quantity, and a considerable quantity of dextrins. No evil effect followed the eating of a fair number of the seeds. As a further test, a quantity of the pressed oil cake was given to a calf and a goat. Neither of them ate it with relish, but both did so after a short time. This was followed by no evil result in either case.

It may be taken, therefore, that the seeds of **Cochlospermum Gossypium** form a fairly nutritious food, and in case of necessity would be quite adapted for this purpose both for animal and man.

Analysis of oil-cake.

The analysis of the cake is given below :—

	Per cent.
Moisture	9·90
* Albuminoids	21·50
Oil	8·10
Carbohydrates	39·88
Fibre	15·17
† Ash	5·45
	100·00

	Per cent.
* Containing Nitrogen	3·44
† Containing Phosphoric Acid	0·98

It will thus be seen that the oil-cake is fairly rich in nitrogen and phosphoric acid and there seems to be no reason why it should not be used either as a manure or cattle food.

Up to the present very little notice seems to have been taken of the oil yielded by the seeds regarding its nature and use. "The

COCHLOSPERMUM GOSSYPIUM.

Revd. A. Campbell of Chota Nagpur describes a bright red oil which by hot expression he extracted in abundance from the seeds. He adds, although this property of the seeds is well known to the Santals they never extract the oil. Cook in his *Oils and Oil-seeds* alludes to this circumstance, but remarks that beyond the fact of the seeds affording an oil, nothing further is known" (*Watt. Dict. Econ. Prod. C. 1516*). Mr. J. S. Gamble is content to remark in his *Manual of Indian Timbers* (edition 1902), that "the seeds give an oil which is little used." He gives no further information nor is there any information available as to the oil ever being used as an edible oil.

Nature of the oil.

The oil, which was present in our samples of seed to the extent of 14 to 15 per cent., was expressed with a screw press and filtered before examination. The filtered oil was rather thick, of brown colour, the colour getting lighter after several days' exposure to the diffused day light, ultimately assuming a yellow colour, while the oil got quite bleached in 24 hours when exposed in thin layers. But it may be mentioned here that the oil when extracted with ether was almost colourless, having a slight yellowish tinge. It had a peculiar smell and taste of its own, was a liquid at the ordinary temperature, solidifying at 1° C and having ·922 for its specific gravity at 15° C. On analysis it gave the following results :—

Acid value.	Saponification value.	Hehner value (Insoluble fatty acids.)	Iodine value.	Reichert-Meissl value.
14·24 Mgrms. KHO.	186·29 Mgrms. KHO.	95·19%	95·97%	·19 c.c. $\frac{N}{10}$ KHO.

Maumené test or the rise of temperature of 50 grammes of the oil with 10 c. c. of pure concentrated sulphuric acid was observed to be 54°·5 C. On the addition of sulphuric acid the oil turned blue-black first and black afterwards. The melting point of the fatty acids was 35°·5 C.

Not a quick drying oil.

The iodine value and the Maumené test suggested that the oil might occupy an intermediate position between a semi-drying oil and a non-drying oil, since a drying oil is characterised by its greater absorption of oxygen and iodine and by its higher rise of temperature on mixing with strong sulphuric acid than a non-drying oil.

To test its drying property, a clean glass plate was coated with it on one part, and with fresh raw linseed oil on another part, and was exposed at the temperature of the Laboratory. At the expiration of 98 hours the linseed oil got quite dry while the other only became sticky. Further, zinc pastes of the two oils were compared and similarly those

COCHLOSPERMUM GOSSYPIUM. Oil.

of lead pastes. Five grammes of oxide of zinc and 2 c.c. of the oil composed the zinc paste and 5 grammes of white lead and 1 c.c. of the oil the lead paste. A glass plate was coated with the two zinc pastes and similarly another with the two lead pastes. They were then exposed in the Laboratory. In 22 hours the zinc paste of the linseed oil dried completely and that of the other oil became very sticky. In 72 hours the latter was tacky and got very tacky in 96 hours, *i.e.*, on the 5th day and remained so till in 146 hours, *i.e.*, on the 7th day it got almost dry and continued to remain in this condition even for a month. The white lead paste of the linseed oil dried completely in 26 hours, *i.e.* on the 2nd day, whereas the lead paste of the other oil became only tacky on the 8th day and never got dry even after a month.

Its power of absorbing oxygen was also compared with that of fresh raw linseed oil by heating equal quantities of each for 6 hours daily up to the temperature of the steam oven. One hundred parts of the linseed oil thickened in the first 24 hours and increased to 102·7; the next day a skin began to form over its surface, the weight was 104·52 and remained constant until the 5th day when the oil had been converted into a firm jelly. While, on the other hand, 100 parts of **C. Gossypium** oil did not show any increase in weight even after a week when it simply thickened.

From these above facts, it was proved that the **C. Gossypium** oil was not a drying oil, possessing drying qualities to a very limited extent, as was proved by the experiment of zinc oxide paste.

Samples of this oil were shown at the late Colonial and Indian Exhibition and these are now deposited in the Kew Museum. According to Sir George Watt, this oil can be produced cheap and in large quantities; and it may be hoped that at some future time it may be utilised if not for any other technical purpose than for the manufacture of soaps.

G. I. C. P. O.—No. 1236 R. E. P.—27-10-1906—2,500—B. N. D.

(Vegetable Product Series, No. 98.)

THE AGRICULTURAL LEDGER.

1906—No. 6.

BEADS.

[*Dictionary of Economic Products, Vol. I.*, B. 372-387.]

Materials used in making Bead Chains and Rosaries in India. *By* E. F. VIEUX, *Assistant Curator, Indian Museum, Industrial Section.*

MATERIALS FOR BEADS.

Bead chains are made in India from many materials, and worn by almost all classes of people out of religious or superstitious motives.

The following pages are an alphabetical catalogue of the materials used with reference to specimens exhibited in the Industrial Section of the Indian Museum, Calcutta.

Abrus precatorius.

Abrus precatorius.—*Linn.*—The Crab's eye or *rati* seeds.—A climber met with all along the Himalayas and spreading through the plains of India to Ceylon and Siam. The seeds are found in three different colours :—

(1) Red seed with black eye.
(2) Black seed with white eye.
(3) White seed, often dirty white.

The first and commonest is alone used for bead chains. As far back as 1592 mention was made by Prosper Alpinus of the use of these seeds as beads. Its extensive use for necklaces and in rosaries suggested the latin name " precatorius."

Adenanthera pavonina.

Adenanthera pavonina.—*Linn.*—The red wood or *rakta kanchan.*—A tree of very general distribution throughout India with bright scarlet or more rarely yellow brown seeds. The scarlet seeds are made into bead chains worn about the neck.

Adhatoda Vasica.

Adhatoda Vasica.—*Nees.*—The *Baxas* of Bengal.—A small bush, often gregarious, found very widely in India from the Sub-Himalaya tracts to Ceylon. The Nagas use the stems of this shrub for divining and for foretelling omens. A superstition prevails that the fruit of this tree if hung round the necks of children keeps them free from colds. The wood is made into small beads.

BEADS.

Ægle Marmelos.

Ægle Marmelos.—*Corr.*—The *Bael* or Bel fruit tree.—This tree is found in cultivation all over India and wild in the Sub-Himalayan forests from the Jhelam eastwards, in Central and South India and in Burma. It is sacred amongst the Hindus and frequently alluded to in ancient Sanskrit poems as an emblem of increase and fertility, having sprung from the milk of Shri, the goddess of abundance. Its leaves are used in the worship of Siva and of Parvati. The beads made from this are strung with the fibre of *Agave* and are worn by the Sudras to denote that they are not Muhamedans.

Æschynomene aspera.

Æschynomene aspera.—*Linn.*—The Sola.—A small, sub-floating bush, frequently found in marshes and growing mostly during the season of inundation in Bengal, Assam, Burma and South India. It is used for decorating idols during certain festivities.

Allium sativum.

Allium sativum.—*Linn.*—The Garlic.—Cultivated all over India. In Poona it is stated that a necklet of the bulbs is worn by children suffering from whooping cough.

Aquilaria Agallocha.

Aquilaria Agallocha.—*Roxb.*—The Eagle wood.—A large evergreen tree of Sylhet and Tenasserim, extending through Manipur, Chittagong, Arakan to Mergui and Sumatra. The wood is largely used for rosary-beads.

Areca Catechu.

Areca Catechu.—*Linn.*—The betel-nut palm.—A cultivated plant found throughout tropical India. The nut is used in many religious ceremonies and in beads.

Cæsalpinia Bonducella.

Cæsalpinia Bonducella.—*Fleming.*—The fever nut.—Found all over India, especially in Bengal, Burma and Southern India, bearing seeds or nuts. It is stated in Bombay that necklaces of the seeds strung upon red silk are worn by pregnant women as a charm to prevent abortion. They are also hung upon trees to prevent their fruit falling off. In Egypt the nuts are strung as necklaces and worn by women as amulets against sorcery.

Canna indica.

Canna indica.—*Linn.*—The Indian shot.—This plant is common all over India and Ceylon, chiefly in gardens where it is grown for ornament. It flowers all the year round, and has a black hard seed resembling shot. These seeds are strung as necklaces.

Caryota urens.

Caryota urens.—*Linn.*—The Hill or Sago palm.—A beautiful palm met with in the forests of the western and eastern moist zones. It is common in Bengal, Burma and Orissa. The seeds are used by Muhamedans as beads.

Coix Lachryma-Jobi.

Coix Lachryma-Jobi.—*Linn.*—Job's tears.—A tall, erect grass met with on the plains of India and on the warm slopes of the hills from the Panjab to Burma. The three varieties—*viz.*, *typica*, *monilifer* and *stenocarpa*—are very extensively used as rosaries. The first variety is used by the Chins for their rosaries. It may also be used in Hoshangabad and Bhandara by the Gonds and Kúrkús, where boys are made to wear the grains in the form of necklaces. The second variety is also worn by Burmans, and more especially

those of North Arakan and the Kachin Hills. It is the third variety *stenocarpa* which is the general ornament of a Kachin garment. The nut is very much elongated, generally being nearly ¾ of an inch long. The Chins wear it strung into necklaces. BEADS.

Cocos nucifera.—*Linn.*—The Cocoa-nut palm.—A palm cultivated throughout India and Burma. It is in some measure held sacred. Beads made from the shell are said to be very common in Burma. It is darkened by steeping in oil. Hindu women wear necklaces of the dried kernel. The cocoa-nut itself is largely employed as offerings to the gods by the Hindus, and cocoa-nut day (the full moon in August) is celebrated throughout the country. Cocos nucifera.

Corypha umbraculifera.—*Linn.*—The fan palm of South India.—A large cultivated tree in Bengal and Burma. Flowers at the beginning of the hot season. The fruit or nut is hard like ivory and is carved into beads that resemble the "Rudraksha" seeds. The beads are worn by Hindu devotees. Corypha umbraculifera.

Elæocarpus Ganitrus.—*Roxb.*—The utrasum bead tree or *Rudraksha.*—This is a large tree found in Nepal, many of the subdivisions in Assam (*viz.*, Lakhimpur, Mangaldai and Golaghat) and in the Concan ghats. It is also very common in Singapur from where it is said the nuts are largely imported. Some few years ago—in 1899—when it was reported that a trade in these nuts would be advantageous, it was ascertained from Assam that the sale price per maund (82⅔ lb) of the nuts would be R10 (13*s.* 4*d.*) at Dibrugarh, and R12-8 (16*s.* 8*d.*) at Calcutta, but no dealers in that province came forward to establish the trade. In Bombay an experiment was tried by a local gentleman on the other uses to which the seeds could be put; and hat pins, coat-buttons and the like were the results. A further experiment was made by coating the "Rudraksha" with copper and silver after removing the seed by burning, and the effect was said to be very satisfactory. Elæocarpus Ganitrus.

The followers of Siva make it a religious duty to wear a necklace of these seeds in order to obtain the heaven wherein Siva resides, and sometimes also in the belief that it wards off pains. It is believed by some that these seeds bear marks resembling the human face and others maintain that the *Rudraksha* necklace is the symbol of the "Eyes of Mahadev."

The seeds are either of a deep straw colour or dark brown, but if the latter and too dark, they can be whitened by immersing them in a solution of chlorine for about 12 hours and then washing and drying. The chlorine is generated from a mixture of nitric acid and chlorate of potash, two parts of strong nitric acid being diluted with four parts of water and one part of chlorate of potash added. The nuts are then immersed in the liquid and the glass vessel is placed in a warm situation until they are sufficiently bleached. The acid is then poured off and the nuts washed well with hot water and dried.

BEADS.

The necklaces made from these seeds are obtainable everywhere. Sometimes the seeds are seen strung alternately with gold balls or with pieces of red coral, or in some instances with a round button made of white corded silk.

Elæocarpus lanceolatus.

Elæocarpus lanceolatus.—*Blume.*—The *utrasum* beads.—These are said to be imported from Java. They are smaller than beads of **E. Ganitrus.**

Elæocarpus tuberculatus.

Elæocarpus tuberculatus.—*Roxb.*—A large tree found in South India and in Burma. The nuts of this tree are used in the same way as those of **E. Ganitrus.**

Entada scandens.

Entada scandens.—*Benth.*—A large climber of the Eastern Himalaya, Eastern Bengal, South India, Manipur, Burma and Andaman Islands. The seeds are worn as charms.

Euonymus, grandiflorus.

Euonymus grandiflorus.—*Wall.*—The *Siki* nut.—A small tree of the Himalayas bearing seeds which are strung and used as necklaces in Bussahir.

Ficus glomerata.

Ficus glomerata.—*Roxb.*—The *Gular.*—A large tree of the Salt range of Rajputana and found also in Bengal, Assam, Burma, Central and South India. It is regarded as sacred, and in the *Baroda Gazetteer* it is stated that there is a common belief that near every *umbar* tree there runs a hidden stream. The fruits are strung and put round a pregnant woman's neck towards her confinement.

Flacourtia Ramontchi.

Flacourtia Ramontchi.—*L'Herit.*—The *Bilangra.*—A small thorny tree met with in dry hills throughout India and in Prome, its wood being hard, red, close and even grained. The seeds are strung as necklaces, and in the Deccan the women pound them and rub the powder over them after childbirth.

Gyrocarpus Jacquini.

Gyrocarpus Jacquini.—*Roxb.*—The *Zaitun.*—A tall tree common in South India, Malay peninsula, the Andaman islands and Tenasserim, but rare in Bengal. The seeds are made into rosaries and necklaces.

Linum usitatissimum.

Linum usitatissimum.—*Linn.*—The common flax.—An annual plant cultivated throughout the plains of India and up to altitudes of 6,000 feet. It is stated that flax necklaces are made which are composed of sections of the stem.

Melia Azedarach.

Melia Azedarach.—*Linn.*—The Persian lilac: Bead tree.—A tree commonly cultivated in India, but is wild in the Sub-Himalayan tract at altitudes of from 2,000 to 3,000 feet. It is said that this tree was probably introduced into Southern India by the Muhamedans. The stone from the fruit is used as a bead during the prevalence of an epidemic.

Nelumbim speciosum.

Nelumbium speciosum.—*Willd.*—The sacred lotus.—A large aquatic herb found all over India and extending to Kashmir. Its flowers are rosy, red or white, and bloom during the hot season. This plant attracted the attention of the ancient Hindus and is described in great detail by Sanskrit writers. The flowers are sacred to Lakshmi and the nuts are strung as beads.

BEADS.

Ocimum basilicum.—*Linn.*—The common sweet scented Basil.—An annual, indigenous in Persia and Sind, and found growing throughout India. The seeds are sometimes strung into rosaries. Ocimum basilicum.

Ocimum sanctum.—*Linn.*—The *Tulsi* or sacred Basil. A small shrub found throughout India, Burma and Ceylon, and though common in waste places, it is more frequently cultivated. It is the most sacred plant in the Hindu religion, and the Brahmins hold it sacred to the gods Krishna and Vishnu. The woody stem is made into beads and these rosaries are used by Hindus on which they count the number of recitations of their deity's name. These are worn by Vishna-vas. Ocimum sanctum.

Oroxylum indicum.—*Vent.*—The *Sona.*—A tree of general distribution throughout India and Burma. The seeds are sometimes employed for making rosaries. Oroxylum indicum.

Putranjiva Roxburghii.—*Wall.*—The *Joti* or *Putanjee mala.*—A moderate sized evergreen tree with pendant branches met with, wild and cultivated, throughout tropical India. The stones of the fruit are strung together to form rosaries and necklaces. They are worn by Hindu fakirs and Brahmins and also by children to keep off evil spirits, hence the vernacular name which signifies "the life of the child." It is also said to be used as proof against headaches. Putranjiva Roxburghii.

Samadera indica.—*Gærtn.*—The *karinghota of* Malabar.—This tree is found in South Konkan, Malabar and the western peninsula. The seeds are used as necklaces for children to prevent asthma and affections of the chest. Samadera indica.

Spondias mangifera.—*Willd.*—The hog plum.—A small tree found either wild or cultivated throughout India, bearing fruit with a stone. A woman, whose children die prematurely, places a thief's fetter about one of the legs of the child and also a necklace of these stones. Spondias mangifera.

Religious necklaces, however, are not confined to those made of seeds and nuts alone. Skulls, human bones, boar and elephant tusks, the horn of the bison, the vertebræ of snakes and even stones are used. The last named are usually worn by Fakirs.

Beads are also made from white clay in the western part of the Bellary district of the Madras Presidency and in the portions of Dharwar and the Mysore province which adjoins it. There are women of the lower Sudra caste who have been dedicated to deities. These women take the place of a son in the performance of religious rites of parents and in inheritance of property. They are styled "basivis." They wear a necklace which must have five white clay beads on it. Even the priests and priestesses wear the same number of white clay beads round their neck, and so do also the members of families in which priestly functions are hereditary. White clay beads.

BEADS. Rosaries and necklaces in the Indian Museum.

The following rosaries and necklaces are represented in the Indian Museum, Calcutta :—

Ægle Marmelos.

Ægle Marmelos.—No. 26066 (Ec.) is a bunch of seven necklaces made of the wood of this tree. They were purchased by the Reporter on Economic Products at Jajpur in Cuttack for ½ anna a piece. These necklaces are worn by the "Shibas." Each comprises 300 small pieces of wood so cut as to resemble seeds, and usually measures 24". No. 6702 (Ec.) is another necklace made from this wood and obtained from Ganjam in the Orissa district. It contains 255 pieces of wood and is 20" long.

Cocos nucifera.

Cocos nucifera.—No. 26065 (Ec.) is a bunch of 15 necklaces presented by the Reporter on Economic Products who procured them from Jajpur. Each necklace is so made to contain 288 seeds. The "Boistabs" or worshippers of Vishnu wear them. They are 20" long.

Coix Lachryma-Jobi.

Coix Lachryma-Jobi.—var. Stenocarpa.—The Deputy Commissioner, Naga Hills, sent a number of necklaces of different sizes from 46" to 82" long made of these grains. (Regr. No. 10490 Ec.)

Corypha umbraculifera.

Corypha umbraculifera.—Specimen Nos. 9374 and 9375 received from Malabar through the Board of Revenue, Madras. The former contains 26 nuts and is 18" long, and the latter is made up of 55 nuts and measures 39".

Elæocarpus Ganitrus.

Elæocarpus Ganitrus.—Specimen No. 4981—1 presented by Dr. H. H. Wilson. This necklace comprises 42 seeds each alternated with a round button and is 30" long. No. 1113 is from Cawnpur. It contains 96 seeds and is 53" long. Two necklaces, Nos. 10246 and 10247, each containing 109 seeds and 68" long, were procured from the Calcutta market at Rs-10-0 each. The traders obtain the nuts from Nepal, and string them in Calcutta. One of the nuts is strung differently to the other one hundred and eight. The one hundred and eight represent the one hundred and eight names of Vishnu or to a Buddhist the one hundred and eight symbols on the sole of Buddha's foot.

Ocimum sanctum.

Ocimum sanctum.—Specimens Nos. 4981, 9445 and 9446. The first was presented by Dr. H. H. Wilson and is made up of 497 beads and measures 154". The other two were procured through the Reporter on Economic Products from Saharanpur and comprise 108 and 109 seeds respectively and measure 33". The Forest officer of South Salam, Madras, sent a specimen (No. 24568 Ec.) of a rosary which contains 80 beads and measures 26".

Putranjiva Roxburghii.

Putranjiva Roxburghii.—Specimen No. 9377. This was received through the Reporter on Economic Products from Kangra. It is made up of 62 seeds and is 24" long. No. 1112 is from Cawnpur. It contains 112 stones of the fruit and is 44" long.

Vertebræ of snake.

A specimen of a rosary made of the vertebræ of the snake

BEADS. Stone necklace.

"Sankinee Rajsarpa" is seen in specimen No. 6490. It was received from Bankipore.

Specimen No. 5885 is a rosary made of stones. It was recently identified by the Geological Department, and was said to be made of agalmatolite, also known as pagodite or pagoda-stone. Such stone is chiefly found in China, and it is presumed this rosary came from thence.

G. I. C. P. O.—No. 1235 R. E. P.—27-10-1906.—2,500.—B. N. D.

(Vegetable Product Series, No. 99.)

THE AGRICULTURAL LEDGER.

1906—No. 7.

[Reprint from the Bengal Bulletin No. 8 of 1905.]

AGAVE AND FURCRAEA SPP.

[*Dictionary of Economic Products, Vol. I., A. 602-638; Vol. III., F. 749.*]

NOTES ON AGAVE AND FURCRAEA IN INDIA.

BY J. R. DRUMMOND AND D. PRAIN.

NOTES ON AGAVE AND FURCRÆA IN INDIA

[*Dictionary of Economic Products, Vol. I, A. 602-638; Vol. III, F. 749*]

BY J. R. DRUMMOND AND D. PRAIN.

INTRODUCTORY.

WHAT is often called "**Aloe-fibre**" collectively is obtained in India from different plants assigned to the genera--

(1) **Sansevieria** . . *Nat. ord.* **Hæmodoraceæ**
(2) **Agave** . . . „ **Amaryllideæ**
(3) **Furcræa** . . . „ **Ditto**

Sansevieria yields "**Bowstring Hemp**" and is dealt with in *Kew Bulletin 4, April 1887*, to which nothing need be added here except that one or more *Sansevierias* appear to have meantime come into commercial use in India.

5 May

The object of this paper is to clear up so far as possible certain questions of botanical identity with regard to those forms of (2) and (3) that are domesticated in this country, and we have accordingly dealt with their history in some detail in another part of the paper. For those who may care to know our conclusions, without following all the steps that have led up to them, the first part will, we hope, be found useful, though it necessarily anticipates a good deal that is more fully discussed in the second.

PART I.—DESCRIPTIVE.

THE first part includes—

(*a*) a brief general description of the genera **Agave** and **Furcræa**, limited however as regards the former to the section *Euagave*;

(*b*) a description of those * species which are naturalized in India, or cultivated for their fibre, with a key to the species of *Euagave*;

(*c*) remarks on certain of the species known in India.

* Also of one species which is neither naturalized nor grown for fibre, viz., the "*False Sisal.*"

GENERAL DESCRIPTION OF EUAGAVE AND FURCRÆA.

Place in Classification of Plants.

We have followed Bentham and Hooker in regarding **Agave** and **Furcræa** as belonging to the **Amaryllideæ**, but whether this arrangement be adopted or not, **Agave** and **Furcræa** with a few minor genera form a natural tribe which may conveniently be styled the "**Agaveæ.**" It has been proposed to include the "**Yuccas**" with this, and to elevate **Agaveæ** to the rank of a Natural Order. The objection that this would include types with the ovary "superior" as well as those with it "inferior" is not very weighty (*cf. Engelmann's Collected Works, Cambridge Mass. 1887, p. 301*).

General Description of Flowers.

Both in **Agave** and **Furcræa** the perianth is divided into six usually uniform segments; in **Furcræa** these are separated for their whole length, but in **Agave** the "germen" (containing the ovary) is continuous with a cup which surrounds the base of the style and gives rise to the stamens, usually —though not always—at the same level as the free lobes of the perianth, which vary in outline from ovate-lanceolate to narrowly ligulate. In **Furcræa** the flower is more or less bell-shaped, and the segments broadly ovate; while the stamens often have their stalks dilated and are not inserted on the cup of the perianth but upon a ring which embraces the conical pistil. Moreover the stamens in **Agave** are doubled back within the bud, springing up elastically when the bud opens. The anthers of **Agave**—which, though absolutely large, are small in proportion to the size of the plant when compared with those of **Crinum**, or **Lilium**, for example, or of some **Gramineæ**—are versatile In **Furcræa** the stalk of the stamens (filament) is stouter and shorter than in **Agave**, and the anthers, which are usually attached by their backs to the filament, do not overtop the perianth. The style in most *Euagaves* is at first shorter than the stamens, but elongates gradually until it overtops them, after which they shrivel up with the limb of the perianth-segments, but remain attached for some time to the maturing "pod" or capsule. In **A. Wightii** (*A. vivipara* of Wight) the bases of the perianth-lobes change in texture, as the ovules ripen, and remain as a beak to the capsule.*

* *Engelmann* (*l.c., p. 304*) was led to suppose that the flower in *Agave* is vespertine or nocturnal. This was due to his having studied *A. virginica Linn.* only, a peculiar type which should probably be placed in a separate genus. The

AGAVE & Furcræa

General Description of Inflorescence.

The blossoms (in **Euagave**) are arranged in clusters* on the ultimate offshoots of a compound inflorescence, which consists of a series of main branches given off spirally from the main flowering stem or scape, which attains (*e.g.*, in **A. Vera-Cruz,** *Miller*) a height of thirty-five feet including the panicle. The scape is furnished with scarious bracts, and there are similar but smaller bracts at the origin of the subsidiary branches. The blossoms in **Furcræa** are arranged in rows (with a bract to each blossom) along the secondary branches of the panicle. The arrangement of the main and ultimate branches varies considerably, but is constant and often characteristic for particular species. In all, however, it conforms more or less closely to the well known "candelabrum" structure.

The leaves of *Euagaves* are very fleshy, usually ensiform, with a thick base which clasps the trunk by a dilated margin: above this the leaf is more or less narrowed or constricted, and then broadens upwards to the middle or above it, when it tapers to the point which merges in a cartilaginous prolongation of the leaf-margins or is capped by a stiff sharp horny spine which appears to originate in twisted strands of the internal fibres. In **Furcræa** there is seldom even a vestige of a terminal spine, and the tip, though usually involute for about an inch or less, is not ordinarily cartilaginous.

of Leaves.

The margins of the leaf are beset at varying intervals with spines or prickles, differing in structure in the different species, but usually consisting of a thin sharp more or less transparent thorn arising from a broader opaque cushion which is formed presumably from the thickened epidermis of the leaf-margin. The substance of the leaf is always more or less fleshy, consisting of large loosely-compacted cellular tissue traversed lengthwise by a series of vascular bundles which constitutes the "fibre." The structure of these bundles and their direction vary with the species, but in all they appear to arch or interlace

---

Indian *Euagaves* are more or less proterandrous as a rule, but are neither fragrant nor nocturnal.

* In certain species the primary division of the scape is trichotomous: that is, there are two side shoots with a third continuing the axis in the middle, but the blossoms are in pairs with a third flower at a slightly different level making up a ternary fascicle; in these fascicles the axis is presumably shortened, and the lateral bud is perhaps enalogous to a trunk-offset.

AGAVE.

General Description of Leaves.

to some extent towards the margins. The cellular tissue is replete, in most species, with mucilage* and different salts; it takes up and stores water in great quantity, and gives out under certain conditions a sweet sap or mead (as in the case of the "Pulque"-producing species). A nectar is secreted also by the flowers of most of the *Euagaves*.

The skin of the leaves is so arranged as to check transpiration (*Miss. Bot. Gard. Rep. VII, p. 52*). True hairs are altogether absent. Certain **Furcræas** have the cuticle of the under surface of the leaf equipped with minute tubercles, making the surface to the touch like sandpaper.

The leaves are arranged on the trunk or "*caudex*" in a more or less regular spiral; when the spiral is dense, a marked "*rosette*" is formed (as in "***A. vivipara*"); in other species again, such as **A. sisalana,** the leaves have the appearance of being tufted.† The angle formed by the leaf with the main axis varies greatly as between species; in the same species it is almost mathematically constant.

Periods of Flowering.

All Agaves were formerly supposed to require long periods before attaining maturity, and to perish after flowering; but experience has shewn that several species are truly *polycarpic*. As a rule, however, the *Euagaves* are *monocarpic*. (Cf. *Watson in Gard. Chron. 1. 1897 pp. 166–167.*)

Not always once in the plant's life.

A. americana *Linn.* is the most variable as regards the period of flowering, but the recorded instances of prolonged dormancy are due probably to the specimens being cultivated in the north of Europe.

A. Vera-Cruz *Miller* appears to "pole" in South Spain after six years on an average, or on the Adriatic after twelve or fourteen, in a naturalized condition. In North India most of the **Agaves** (except **A. americana,** *Linn.*) seem to pole from their fifth to their seventh year, but if that be passed without flowering then not till the twelfth or fourteenth.

The Yucatan Indians are said to have a secret by which they can tell when the "**Sacqui**" (a species near to "**sisalana**") is about to pole, and by cutting off the bud poling is retarded in the interests of the planter.

---

* *Saponin* is said by several writers to be present in the leaves and roots, but recent chemical analysis is reported not to have confirmed this.

† Forming a "*coma.*" ** *i.e.* our **A. Wightii.**

When a shoot has blossomed then in ordinary course it dies, but the trunk may give off living offsets, or new buds may form. In certain species, notably in **A. Vera-Cruz** and **A. sisalana**, the suckers often flower along with the parent. AGAVE & Furcræa. Formation of Suckers.

Poling is accelerated, and may be produced, by injury, by sharp cold, transplantation, or any other sudden change in the condition of the individual. At Algiers in 1830 the French had occasion to clear for military purposes a piece of ground that was much overgrown with **Agave** and the soldiers were encouraged to destroy the plants, which during 1830-31 they did by hacking the leaves and slicing off the cone of inner leaves by way of sabre-practice. In 1832 the whole plain was covered with the bloom of some 1,500 Agaves (*Bull. Soc. Bot. de France IX, p. 146*). The effect of checks to the vegetative system in developing floration are familiar (an every-day example is afforded by the pruning back of roses); but for most purposes it may be assumed that any of the Indian **Agaveæ** (including "**sisalana**") may flower by its seventh year or even earlier.

The flowers of all the *Euagaves* are partly "herbaceous," *i.e.*, they retain to some extent the special texture and colouring of the vegetative parts, as distinguished from those of a normal perianth. Those parts of the flower (except the pollen) that do not thus lean to the vegetative type are generally of a more or less transparent amber. In **A. sisalana**, and perhaps in other species, the filaments are delicately banded ("fasciated") with a faint pink. The ripe pollen is invariably orange yellow, though the intensity varies with the species, and in the same species with the stage of development. There seems little reason to doubt that **Euagave** and **Furcræa** are wholly anemophilous. *Miss Mulford (Missouri Bot. Gdn. Rep. VII above quoted)* evidently thinks that the high scape and honeyed blossoms serve to attract small birds and large insects. Doubtless they do, and the aid given by this means is through the shaking of the flower or branches. Hybridization under artificial conditions is reported. With the larger species in a state of nature we should think it is of very rare occurrence. Colour of Flower. Wind-fertilised.

All or nearly all the **Euagaves** are proliferous, *i.e.*, instead of all the flowers producing ripe seed-bearing capsules a certain number develop buds direct without seeding, which Production of Bulbils.

AGAVE.

Bulbils.

are detachable and, on reaching the ground, commence an independent cycle of existence. Once the vegetative cone has formed in a bulbil, it is independent of the parent, as has been observed in several instances where the old plant had been killed and the pole was decaying; an example was seen by us near Calcutta on the 10th August 1904 in the case of "*A. vivipara.*" The fruit both in **Furcræa** and **Agave** when

Description of Capsule.

it ripens is a three-celled rather woody capsule, with a green or black rind, packed with numerous horizontal flat seeds of a shiny black, or in some species opaque. Its shape is various, from a depressed sphere to an oblong cylinder; sometimes it is furrowed or three-cornered.

Description of Embryo and Germination.

For the embryo of **Agave** we quote *Engelmann* (l.c., p. 305):—

"*The filiform, cylindric, or slightly compressed embryo is as long as the hard whitish semi-transparent, farinaceous and oily albumen. In germination the seed-shell is elevated above the ground on top of the largely developed foliaceous cotyledon, contrary to the behaviour of Yucca where the husk enclosing the small and soon decaying cotyledon remains buried in the ground.*"

We have not seen the embryo in **Furcræa** or any account of it.

Colour of Leaves.

We have made no reference above to the colour of the leaves of the Indian **Agaveæ,** because this can best be handled in the descriptive list which follows; but the following general remarks may be found useful:—the prevailing colour of the upper surface of the leaf-blade in **Euagave** is a deep "sap green;" the under side is commonly the same, but a shade or more lighter. In **A. decipiens,*** *Baker* the whole leaf is of a bright glossy apple green, which is unusual. In different species the ground colour of the leaf is tinged with obscure shades of grey, or dull blue; and the edges may be parti-coloured, or the leaf striped with pale 'ribbons.' Several species have a bloom, on the young leaves especially, and in **A. Vera-Cruz** this is frequently so marked and permanent, even in old plants, that the leaves are termed "glaucous." In **A. Cantala** the green is much lighter and less "sappy" than in the "**americanae**" but the tint is different from the vivid green of "**decipiens.**"

* This if not identical with **A. Ixtli,** *Karwinski* is very near it.

AGAVE.

Key to Indian Species.

DESCRIPTION OF SPECIES.

KEY.

Leaves in section flat to concave but never channelled throughout :—

Teeth minute, close set . . . . . Species ***A*** ———

Teeth larger, more or less remote :—

Leaves in a lax rosette or tufted, never less than 3 feet in length :—

Perianth segments not constricted towards the tip :—

Leaves broadest in the middle, tapering to both extremities :—

Leaves oblong lanceolate, neck sharply constricted . . Species ***B*** (**americana,** Linn.)

Leaves linear oblong, neck not constricted :—

Marginal prickles pointing uniformly downwards, leaf flattish throughout . . . . . Species ***D*** (**Vera-Cruz,** Miller)

Marginal prickles of upper part of leaf pointing upwards leaf deeply trough-shaped in upper fourth Species ***C*** ———

Leaves hardly widened in the middle very narrow in proportion to their length :—

Leaves linear lanceolate curving outwards throughout their length, terminal spine acicular . . . . Species ***E*** (**Cantala,** Roxb.)

Leaves narrowly oblong, not curving, stiff, erect, terminal spine conical from a stout base . . . Species ***F*** ———

Perianth segments narrowed from about the middle to the ligulate tip :—

Leaves straight . . . . . Species ***G*** (**sisalana,** Perrine)

Leaves drooping from their upper third or less . . Species ***H*** ———

Leaves in a close globose rosette never exceeding 3 feet in length Species ***I*** (**Wightii,** nobis)

Leaves in section canaliculate . . . . . Species ***K*** (**decipiens,** Baker)

AGAVE.

Agave sp. . . . . *A*

Species A. described.

Leaves linear-oblong 20–30 in a very lax rosette from a moderately thickened base, deep green with a glaucous bloom, tapering rather quickly in the upper portion, about 5 feet in length and as many inches in breadth at the widest part rather above the middle, marginal prickles minute but sharp, when young garnet-coloured, pointing both upwards and downwards, sometimes absent in the upper portions of the leaf altogether; terminal spine brown, subulate, slightly channelled.

INDO-CHINA: Burma; Tenasserim.

DISTRIB.: Unknown.

This we suppose to be the same as a plant cultivated in the Saharanpur Bot. Garden under the erroneous name of "*A. Ixtilli.*"

AGAVE AMERICANA described.

~~A Garden Aloe of India~~

Agave americana *Linn.* . . . *B*

Leaves lanceolate, many in a lax rosette from a short stout prostrate or ascending trunk which is usually hidden by their thick bases, deep green, often variegated with white or pale yellow longitudinal stripes or borders, sometimes rather glaucous; at base spreading, then ascending, tips sometimes recurved, 4 to 6 ft. long and as much as half a foot broad above the middle; sharply constricted just above the base; margins armed with strong dark brown prickles mostly pointing downwards, leaf edge between the prickles concavely indented, terminal spine slightly grooved dull brown 1 to 2 in. long derived from the upper leaf margins which for about three inches from the top are involute and horny; scape with the panicle 15 to 25 ft. in height, primary branches of the inflorescence almost horizontal, fascicles of blossoms crowded at the ends of subsidiary ascending branches; germen faintly sulcate about equalling the perianth or shorter than it; perianth lobes ovate lanceolate tips obtuse, amber-coloured as are also the filaments, pollen orange yellow, style faintly three-lobed capitate; capsule bluntly trigonous or oblong-cylindrical, rather broader upwards.

Linn. Sp. Pl. (Ed. 1) i. 323; Kunth, Enum. V. 819; Thornton, New Illustr. aft. p. 100 (also col. fig. in Select Plants); Andr. Bot. Rep. vii. t. 433 (sphalmate 438);

Bot. Mag. t. 3654; Nees, Gen. Fl. Germ. Monocot. Vol. iii. tab. sec.; Reichenb. Fl. Germ. ix. t. 374.

AGAVE AMERICANA described.

INDIA: Large gardens and parks throughout India.

DISTRIB. Gardens throughout Northern Europe and North America. Native country unknown.

The plant, widely naturalized and commonly termed *Agave americana* in Southern Europe, we believe to be **A. Vera-Cruz** *Miller.* The remarks under *A. americana* in *Linnaeus' Species Plantarum* cover both the true **A. americana** and *Miller's* **A. Vera-Cruz.**

A. Milleri, *Mart. Flor. Bras. iii.* 1. 183 appears to be this species. *A. americana, Mart. vix Linn.*, appears as regards description and synonymy to refer for the most part to **A. Vera-Cruz** *Miller.* The description of *A. americana* by *Mr. Baker* in *Gardener's Chronicle* N. S. vii. 201 (1877) gives an excellent account of **A. americana** *Linn.* but the remarks apply in part to **A. Vera-Cruz** *Miller.* The Peruvian plant named *A. americana* by *Ruiz* and *Pavon* is perhaps different from either.

Agave sp. C

AGAVE. Species C. described.

Leaves oblong-linear many from a very thick short caudex which is hidden by their greatly thickened bases, dark-green, glaucous, spreading from the stem but presently ascending, tips recurved stiffly, blade six feet long and upwards, measuring eight to twelve inches at the widest part some way above the middle, and there forming a deep trough through bending of the leaf and rolling inwards of the margins, prickles very stout and black, those above the trough-like portion of the leaf spreading or ascending, the rest pointing downwards, terminal spine about $\frac{3}{4}$ in. long dark coloured. [Inflorescence not available.]

INDIA: cultivated in the Botanic Garden, Saharanpur, received from Europe.

DISTRIB. Native country unknown.

This seems closely allied to **Agave Vera-Cruz** *Miller.* It is known at Saharanpur as *A. Jacquiniana*, but it certainly is not the plant figured under that name in *Bot. Mag.* t. 5097. The leaves of this species when fresh cut smell like cut Rhubarb stalks, and their juice soon ferments.

AGAVE VERA-CRUZ described.

~~The Common Grey Aloe of India.~~

Agave Vera-Cruz . . . . *D*

Leaves linear-oblong, many, from a short stout trunk which is hidden by their thickened bases, sage green often very glaucous, early curving upwards, the ends usually more or less recurved or drooping, four to six feet long, often rather concave at the widest part which is above the middle and attains a breadth of ten inches and upwards, neck hardly constricted, leaf margins little indented or nearly straight between the prickles, which are broad, stout, black or dark-coloured, spreading or decurved, interval between the prickles about half an inch or less, seldom ¾ in.; terminal spine shortly channelled, ½—1 in. long, dark brown, not or very shortly decurrent; inflorescence panicled, trichotomous as regards the main branches which are curved and flattened, blossoms in pairs with a subsidiary bud laterally developed at a different level; germen smooth cylindric longer than the perianth, perianth-lobes linear-lanceolate of a pale amber tint, cup herbaceous, stamens much exserted, anthers half an inch in length and upwards, pollen dull-yellow, style very faintly lobed, capsule rather turgid oblong-cylindrical, tip rounded, seeds black shining. *Miller, Gard. Dict. ed. 8. n. 7.*

Agave lurida, *Zuccarini in Nov. Act. Leop. Carol. xvi. 2. 670, tt. 49, 50*; *Mart. Flor. Bras. iii. I, 185*; *Bak. in Gard. Chron. N. S. viii. 264 (1877)* excl. var. *Jacquiniana* and ref.; not of *Jacquin Coll. iv. 94, t. I*; nor of *Gawler Bot. Mag. 1522.* Agave Vera Crucis *Haw. Syn. Succ. 72.*

INDO-CHINA: Burma; Taungtha, *Burkill* 23,777! and other localities in dry Central Burma, *Burkill*: Assam; Cachar, *Burkill* 16260! Brahmaputra Valley, frequent, *Burkill* 19958!

INDIA: Bengal, Katihar, *Burkill* 20871! Gangetic delta, frequent; Botanic Garden, Shibpur, cultivated; Upper Gangetic Plain; from Tirhoot (in hedges) to Rohtak (S. E. Panjab), *Burkill* 18173, but usually planted; cultivated in Botanic Gardens as far as Lahore. Chota Nagpur; Singhbhum, *Burkill* 19759! Central India; Bilaspur: Western India; Bombay, cultivated *Burkill* 16682! 16686! Deccan; Miraj, *Burkill* 16712! South India: Bellary, *Burkill*; Chingleput, *Barber* 2401! Gantur, *Barber* 2042, 2085, Chingleput, *Barber* 2086, Kurnool, *Barber* 2041, 2068, Salem, *Barber* 2070, Kistna, *Barber* 2501, Coimbatore, *Barber*, 2502, Madura *Barber*, 2503, 2505, Anantapur *Barber* 2513, S. Arcot, *Barber* 2516, Cuddapah, *Barber* 2517, Nellore, *Barber* 2518, Tanjore, *Barber* 2529, N. Arcot, *Barber* 2531, Bellary, *Barber* 2003, 2532, Godaveri, *Barber* 2533, Tinnevelly, *Barber* 2587, 2591 Vizagapatam, *Barber* 2594; Circars: Parlakemedi, *Burkill* 24420! Ganjam; in hedges at Chatrapur. Madras Agri-Horticultural Society's Garden cultivated: naturalized in Mysore, *Butler*!

The references in *Aiton Hortus Kewensis* ii. 302, *Willdenow Species Plantarum ii. 193* and *Gawler Bot. Mag.* t. 1522 are

so confused that the only safe course is to drop all three. The plant dealt with by *Aiton*, though the point is now uncertain, the plant itself having disappeared, may possibly have been the **A. Vera-Cruz** of *Miller*. The *A. lurida* of *Gawler* figured in the Botanical Magazine is not **A. Vera-Cruz**, nor is it any **Agave** known to us at present. *A. lurida* Jacquin, cited by *Willdenow* as the same as *Aiton's A. lurida* and as *Miller's* **A. Vera-Cruz**, is very different from the plant here accepted as *Miller's* **A. Vera-Cruz**. The difficulty in this case has been due to the acceptance by *Aiton* in *Hort. Kew. ed. 2*, of *Willdenow's A. lurida var. a.* which is based on **A. Vera-Cruz** *Miller*, but also includes A. lurida of *Jacquin*, as equivalent to his original *A. lurida*. That original *A. lurida* may have been *Miller's* **A. Vera-Cruz** or it may have been *Jacquin's* A. lurida, it cannot possibly have been both.

AGAVE VERA-CRUZ.

~~Confused literature.~~

DISTRIB. Native country doubtful, probably Mexico; naturalized throughout Southern Europe south of the Alps and Pyrenees, in Southern France and most Mediterranean Islands, also in North-Western Africa and Atlantic Islands; (not recorded from South-Eastern Europe or the Orient): S. Africa; Mauritius; Ceylon.

Agave Cantala *Roxb.* . . . *E*

AGAVE CANTALA described.

~~A frequent Aloe of parts of India.~~

Leaves linear—lanceolate in a lax but even tuft from a short ascending rootstock, pale green sometimes glaucous, older darker tinted, very narrow in proportion to their length which attains 4 feet and more, the greatest width just above the middle being about 3 in., usually 2¼ in., curving gradually outwards from their moderately thick bases, or in weak examples bent over almost from their origin, upper surface more or less concave, sometimes trough-shaped in the lower portion, marginal prickles large for the leaf conspicuous falcate always ascending ¼ of an inch or more in length, very sharp, pale brown or garnet coloured from a small light coloured cushion; terminal spine usually acicular, cylindrical, reddish or dark brown, half an inch to an inch in length; scape with panicle 12—18 feet in height, inflorescence borne on flexuous rather slender branches, fascicles 1-2-flowered; germen equalling or shorter than the perianth, perianth-lobes bluntly linear-lanceolate 1½ in. long, large in proportion to the germen, cup hardly any, lobes divided nearly to their bases, linear-oblong obtuse, greenish yellow. [Capsule not available.] *Roxb. Hort. Beng. 25* A. Cantula *Flor. Ind. ii. 168, Ed. Clarke 296*; *Grah. Cat.*

AGAVE CANTALA described.

Bomb. Pl. 212 ;? *of Galeotti*; not of *Dalz. and Gibs.* which is *A. Wightii*, nor of *Prain*, which is *A. Vera Cruz*; Aloe sp. (*sub Sempervivum majus*) *Rumph. Herb. Amboin.* V. *t. 94.* Fourcroya Cantala, *Voigt Hort. Suburb. Calcutt.;* Agave vivipara, *Dalz. and Gibs. Bomb. Fl.; Bak. in Gard. Chron. N. S. viii.* (1877) 780; not of *Linnaeus* nor of others.

INDO-CHINA: Burma; Tenasserim, Moulmein, *Burkill* 23949.

INDIA: Tirhut; Chilwara, *Campbell*, Tarkaulia, *Burkill* and *Prain* 18918, 18921, 18928!! Upper Gangetic Plain; Etawah, Saharanpur!! Dehra Dun, *Basu*! Panjab Siwaliks; Patankot, *Burkill* 15005. Western India; Thana Bassein, *Burkill* 16656, Salsette, *Burkill* 16684, Coorla, *Burkill* 16701; Deccan, Majuri, *Burkill* 21845! Poona, Satara Road, Kolhapur, Belgaum, *Burkill*; S. India, Circars, *Burkill*; Rajamandri, *Burkill*, 17829, Parlakimedi, *Burkill* 20421! Vizagapatam, Ganjam and Anantapur Dist. *Barber* 2514! Godaveri, *Barber* 2541, 2568! S. Canara, *Barber* 2540, 2600! Chicacole, *Barber* 2088! C. India, Dongagarh and Narsingpur! *Burkill*, very common about Hyderabad, *Burkill*, 25026!

DISTRIB.—Bangka, *Lindgreen*, fide *Kurz*; Amboyna *Rumphius*; Philippines! Native country unknown.

A. Rumphii Hassk., ex descriptione, is not **A. Cantala** Roxb.: *A. laxa* Zuccarini [Bak. Gard. Chron. N. S. ~~VIII~~ (1877) 788 fig. 151] seems near the more flaccid form of **A. Cantala**. *A. angustifolia* Haworth, from St. Helena, is also possibly the same. *Mr. Burkill* notes that the freshly cut leaves of this species smell like Rhubarb. The "*A. americana*" from which fibre is said to be got in China (*Tropenpflanzer* V. 128) may be this species. Specimens of *A. Cantala* are often marked in collections and herbaria '*A vivipara*'.

AGAVE.

Agave sp. . . . . *F*

Species F described.

Leaves narrowly oblong, ten to twenty, tufted on a very short rather narrow caudex, never forming a rosette, making a sharp angle with the main axis, stiff and erect, sometimes pale or bluish, usually a dull green, 4-5 ft. long, breadth almost uniform from the gradually narrowed lower portion to the rather suddenly acuminate tip, small in proportion to the length, at the widest point above the middle from 3½ to 4½ in., marginal prickles rather distant weak and not prominent, chestnut or garnet coloured, their hooks sharp ascending; terminal spine stout conical ½ in. and more long, brown, slightly channelled; scape reaching 15—20 ft. with the panicle, branches of the inflorescence more or less zigzag or flexuous; germen an inch long spindle-shaped constricted just below the perianth

AGAVE Species F described.

which has hardly any cup, the lobes being deeply divided, equal to or longer than the germen, bluntly linear-lanceolate thin and faintly striate. [Capsule not available.]

INDIA; Dehra Dun. *J. S. Gamble No.* 23247. Upper Gangetic Plain; Etawah, *Burkill* 18134!

DISTRIB. Native country unknown. Planted along Railways in N. W. somewhat extensively.

This species differs from **A. Cantala** Roxb. in the stiff upright leaves which are never involute and hardly concave, do not bend outwards and are seldom recurved even at the tip. It also differs as regards the flower which is smaller than that of **A. Cantala** and is more delicate in texture. It appears to be the Agave described by *Mr. T. Moore* in *Gard. Chronicle No. 37 of 1849 pp. 583 and 615* as being inflower in the Chelsea Garden in that year, which he referred doubtfully to the *A. mexicana* of Haworth. *Mr. Gamble* called his plant "*A. mexicana*," referring possibly to the species described by *Moore* which is seemingly distinct from the *A. mexicana* of *Baker* whose "var. *cyanophylla*" (*Gard. Chron. 1877 viii., fig. 36 p. 201*) may be the species of *Miller's Figures* (*vol. II. p. 148 Pl. ccxxii*).

AGAVE SISALANA.

Agave sisalana *Perrine* . . G

Leaves 20—35, oblong-lanceolate, never forming a rosette but closely tufted on the rhizome or on a very short ascending caudex which is completely hidden by their moderately thick bases, the inner making a very sharp angle with the axis, the outer gradually receding but still making less than a right angle, neck not at all constricted, colour deep green, sometimes glaucous, up to six feet long, breadth at the widest part which is just above the middle reaching ten inches, margin with or without prickles, which, if present, are weak, scattered and pale-coloured; terminal spine not channelled, glossy, purple or dark brown; scape 15 feet or more with the panicle, fascicles of blossoms rather crowded; germen equal to or shorter than the perianth slightly broadened upwards, base of perianth convex and somewhat dilated, limb suddenly contracted, narrowly ligulate, tip slightly hooded, style long very faintly lobed early protruded. [Capsule not available.]

INDIA: Introduced into various parts of the country between 1885 and 1892, Cultivated in Burma, Cachar, and Sylhet, Assam, Bengal, North-West India as far as Lahore, Central India, Bombay, Deccan (Poona), Mysore, Madras.

DISTRIB. Native country unknown*; introduced from cultivation in Yucatan in 1834 to islands (Keys) off the peninsula of Florida and there naturalized. Introduced into the West India Islands partly from Florida partly from the American continent. Supposed by *Schott* and *Engelmann* to be derived from a wild species but further evidence as to Yucatan species is wanted; there appear to be several in cultivation there. Cultivated in Australia, Fiji, Hawaii and German East Africa.

In India this species varies as regards presence or absence of spines on the leaf margins. We have seen (*a*) spines fully developed, (*b*) spines partially and irregularly developed, and (*c*) spines altogether absent on leaves of the same individual plant.

AGAVE.

Agave sp. . . . . *H*

Species H. described.

Leaves 20—35, oblong-lanceolate, not forming a rosette, the inner ascending at rather a sharp angle with the axis from a stout caudex, which is altogether hidden by their much dilated bases which attain a thickness of four inches and over,† the ends recurved for about a fourth of the total length and drooping, dull dark green, very often glaucous, reaching seven feet in length and ten inches in breadth at the widest part, which is above the middle, marginal prickles distant (at intervals of $1\frac{1}{4}$ to 2 in.) stout falcate yellow-brown from a broad pale cushion which is inserted in the leaf edge, its pellicle being easily separable from the leaf cuticle and leaving a regularly defined lunate scar on detachment of the thorn—terminal spine not decurrent rather short but stout slightly recurved; scape attaining 20 feet with the panicle, which consists of rather slender wavy main branches spirally inserted one above the other at about a foot's interval on the main stem, fascicles of blossoms somewhat crowded at the ends of the main branches but not thyrsoidly congested, perianth about equal to the germen which is rather sharply constricted just below

* In "*Travels, etc.*" (Philadelphia 1791, London 1794) by the younger **Bartram** there is an account (p. xix of Introduction) of a *Euagave* which the author calls '*A. Vivipara*,'—but evidently solely because it was producing bulbils abundantly,—which he found on a sandy strip of the Florida coast near the mouth of the "*South Mosqueto*" River.

For reasons which need not be detailed here it seems not unlikely that this was **A. sisalana** Perrine, and had been introduced (from the W. India Islands probably) by Spanish colonists, or even previously (*cf.* p. 225 of the same work) by the natives.

† In most **Euagaves** and **Furcræas** the outer leaves droop and wither with age and also when the plant is flowering; characters taken from the leaves apply to leaves in their prime which are usually in the middle of the series.

the perianth, lobes of perianth dilated, almost saccate below, blade suddenly narrowed ligulate diminishing to the obtuse tip which is subspathulate, capsule about 2 in. long narrowly turbinate strongly sulcate at the top especially.

AGAVE.

Species H. described.

INDO-CHINA: Burma; Southern Shan States, Lwekaw and Saga, *Abdul Khalil!*

INDIA: Bengal, planted in a hedge at Barrackpur!! Upper Gangetic Plain; Saharanpur and elsewhere, planted and naturalized in hedges!! Dehra Dun; naturalized and in hedges! Cultivated at Lucknow, where received from Central India, also at Lahore. Madras; N. Arcot, *Burkill* 15145! Chingleput 2087, *Barber!*

DISTRIB. Nat. country unknown.

This is the finest of the naturalized Indian species and might, by the description, be near an **Agave** from Jamaica *(Sir D. Morris)* described by *Mr. Baker* as *A. Morrisii* in *Gard. Chron. Ser. iii. I, part 1, (1887) p. 549, fig. 105,* but we think that the Indian plant is very closely allied to *A. sisalana.* The freshly cut leaves smell like stalks of Rhubarb.

Agave Wightii *nobis** . . . *J*

AGAVE WIGHTII described.

~~The small Aloe of India.~~

Leaves ensiform linear-lanceolate, very many, inserted in a compact series on a stout usually conspicuous trunk which is partly procumbent, or throughout ascending, forming a stiff even rosette 3 to 5 feet in diameter, pale green often tinged with ashy grey, base thin broadly amplexicaul, length attaining 3 feet, but not more than $2\frac{1}{4}$ in. on an average, breadth at the middle where the leaf is widest $3\frac{1}{2}$ in. or less, flat or very slightly convex; marginal prickles rather weak about $\frac{3}{4}$ in. apart, sometimes spreading or erect, but usually consisting of a small brown cushion carrying a semi-transparent garnet-coloured spine which is often sharply recurved parallel to the leaf edge, but ends in a finely-barbed hook which invariably points upwards, terminal spine about half an inch long, pale, slightly

* **A. Wightii** *nobis.*—Caudice amplo manifesto, foliis 2—3-pedalibus medio circa tres uncias latis basi parum incrassata late dilatata summum caudicem amplectentibus lineari-lanceolatis griseo-viridibus, foliorum margine spinis uncinatis primum refractis apice demum ascendente munito, scapo ad 15 pedes altitudinis assurgente paniculam oblongam sustinente, perigonii lobis superne in unguem subito angustatis vix uncialibus obtusatis unguibus denique herbaceis incrassatis cum capsula ovato-turbinata pro rostro persistentibus, seminibus opacis.

AGAVE WIGHTII described.

decurrent; scape twelve to fifteen feet high with the panicle, which is oblong-pyramidal, the main branches short trichotomous, fascicles rather crowded; germen nearly spindle-shaped rather shorter than the perianth and constricted below it, cup of perianth soon dividing into six lanceolate segments each ending in a narrowly ovate lanceolate limb, which is slightly thickened at the obtuse tip and (in dried specimens) obscurely hooded, greenish yellow; capsule brown very broadly turbinate 1¼—1⅓ in. long rostrate by the indurated bases of the perianth lobes, seeds opaque dull charcoal-coloured.

Agave vivipara.—*Wight Ic. 2024; Bak. Gard. Chron. N. S. viii. (1877) 780 excl. all syn. except Wight*, not of *Linnaeus*, nor of *Hill (Veg. Syst. xxiii. f. 56 fig. sinistr.)* nor of *Miller* nor of *Aiton*, nor of *Dalz. and Gibs. Bomb. Flor.* Agave Cantula, *Dalz. and Gibs. Bomb. Flor.* not of *Roxb.*

INDO-CHINA: Sylhet, Moulvi Bazar, planted near villages, but not plentiful, *Wyper*.

INDIA: Bengal; Burdwan, *Burkill* 18930! Hughli-Howrah, in hedges; cult. in Botanic Garden, Calcutta. Tirhut; Tarkaulia, *Burkill and Prain* 19923! Upper Gangetic Plain: Moradabad, *Burkill* 14954! Delhi, *Burkill* 14963, Rohtak, planted in hedges, *Burkill* 18184! commonly naturalized from Saharanpur and Ludhiana as far as Delhi, *J. R. Drummond*!! Cult. and naturalized in Hort. Saharanpur, *Duthie*! Central India; Gwalior, *Maries*! Dehra Dun, *Basu*! Deccan; Berar, *Burkill* 19179, Buldana, *Burkill* 19179! Takari, *Burkill* 16706, Sattara Road, *Burkill*; Poona, *Burkill* 25816! Western India; Bombay, *Burkill* 16677 and 16687! South India; Madras, cult. and naturalized in and near Agri-Horticultural Society's Garden; Chingleput, in hedges, *Barber* 2402! Madura, *Barber* 2504! Tanjore Dist., *Barber* 2515, 2565! Malabar Dist., *Barber* 2535!

DISTRICT.—Native country unknown. A variegated form cultivated in public gardens throughout India is very near this, if not identical.

AGAVE DECIPIENS described.

Agave decipiens *Baker* . . . K

Leaves fleshy linear many closely inserted on an often erect caudex which attains 3 to 4 feet in height, forming a compact radiating tuft, of which the outer leaves are nearly at right angles with the axis, the inner making gradually an acuter angle, 2—4 ft. long, widest just below the middle where the breadth seldom exceeds 3½ in., basal fifth of leaf bluntly trigonous, convex on the sides forming a stalk, upper portion concave often forming a deep U-shaped trough above the middle, the whole leaf stiff, glossy apple-green, more or less recurved and falcate longitudinally, marginal prickles half an

inch to 1½ in. apart, red-brown, very small but sharp, base inconspicuous, seated on a deltoid prolongation of the light green leaf edge/ terminal spine half an inch long and more, with a shallow channel, not decurrent, blackish, very sharp, inclining backwards. AGAVE DECIPIENS described.

[For the inflorescence, which we have not seen, we are indebted to *Mr. J. G. Baker (in Kew Bulletin, July-Aug. 1893, CCLVII* **False Sisal)** as follows,—

> *Peduncle* with panicle about five times as long as the leaves. *Panicle* 8—10 feet long, with a rather flexuose axis, and usually single dense clusters of flowers terminating the laxly-disposed simple arcuate branches.
>
> *Flowers* arranged in dense clusters. Ovary oblong, finally 2 in. long, ¾ in. diam. *Perianth* greenish-yellow, an inch long; tube broadly funnel-shaped; lobes complicate lanceolate from a dilated base, twice as long as the tube. *Stamens* 18—21 lines long, inserted at the middle of the perianth tube; anthers linear ½ inch long. *Styles* finally reaching to the top of the stamens.]

Cultivated only in Botanical and Horticultural Gardens at Calcutta, Saharanpur and Lahore: naturalized in Florida with **A. sisalana** Perrine; native country unknown.

From *Karwinski's* description quoted by *Kunth* (*Enum. V. 835*) *A. Ixtli* Karwinski, a native of Yucatan, should be very near this species. The plant sometimes termed *A. Ixtli* in Indian Gardens has nothing to do with *Karwinski's* plant or with **A. decipiens** *Baker.*

The best known of the fibres called "Istle" or "Ixtli" in Mexico ("Tampico fibre" of the trade) is not derived from any **Euagave** and has nothing in common with *Karwinski's* **A. Ixtli** except the name. The Istle which has been identified by *Spon* and others with *Bromelia sylvestris* or *Nidularium Caratas* is of course altogether distinct, but *Mr. Dodge* has perhaps not hit on the correct solution of the puzzle. *Mr. J. C. Harvey,* writing from the state of Vera Cruz, informs us that the Ixtli of that region is a Bromeliad which yields a good fibre. The confusion has arisen from forgetting that a vague vernacular name may cover half a dozen different species utilised in as many different areas. Ixtli fibre. ~~Confused~~ nomenclature.

A. Ixtli, Salm (of *Gartenflora* 1883 *p. 149 cum fig. p. 150*), is identified with "*A. Karwinskii*, Zucc. *in Kunth's Enum. V.*

AGAVE DECIPIENS.

387" and with *Engelmann's A. rigida* (387 is a slip for 837), where *A. Karwinskii* of *Zuccarini* is described from the *Nova Acta Acad. Carol. Leopold.*, the description not agreeing very well with the sketch in *Gartenflora*, which is like *A. ixthoides* of *Bot. Mag. 5893.* "*A. rigida*" of *Engelmann*, which includes **A. sisalana** *Perrine*, is, so far as **sisalana** is concerned, a very different type of **Euagave.**

FURCRAEA. Species 1. described.

Furcræa sp. 1

Leaves 20—40 rather sharply ascending from a short fairly stout trunk forming a compact tuft, obovate-lanceolate, bright green, upper surface glossy, perfectly smooth on both surfaces, 4—6 feet long and upwards, breadth at widest part which is somewhat below the middle 8·5 in., thickness at this point ·75 in. or under, hardly constricted above the base which is 4 in. across by 2·5 in. or less in thickness, margins irregularly furnished with weak spreading prickles, pale below, rust coloured upwards, occasionally quite spineless, margins involute just below the leaf-apex forming for the last ·75 in. or less a green canaliculate blunt unarmed acumen.

[Inflorescence not available.]

INDIA: cult. in Botanic Gardens, Calcutta, Saharanpur, Lal Bagh, Bangalore (also a variegated form) and most public Gardens in India; Dehra Dun, *Hasu* (but probably from a garden)! planted by Railways in the Deccan, Miraj, *Burkill*; planted and naturalized in W. Mysore, Yercaud, and on the Shevaroy Hills, *Cameron*; near Coonoor *Butler*!

DISTRIB: The native country is not accurately known: it is understood to be extensively cultivated from Venezuela to E. Brazil, whence it was introduced by Father Leries, almoner (of his order?), to the Mauritius, in the 16th century (*Aublet* I. 305) and from the Mauritius, we suppose, to S. India, where it is known as "**Mauritius hemp.**"

The leaf* when crushed exudes a colourless fluid which has a faint but by no means fœtid odour. This plant can hardly be

* Both surfaces of the leaf in this **Furcræa** have a minutely punctulate appearance. This under the lens is found to be due to groups of stomata, in each of which the lumen is occluded by an inorganic laminated octahedral body. In **F. Selloa** (and presumably other species in which the back of the leaf has an "emery paper" feel) these occluded stomata are more numerous, and accompanied by minute cones of the same inorganic structure, ending in an edge like that of a cutting diamond, with their sides laminated, embedded in the cells of the epidermis and extruded from a cavity which is probably a metamorphosed stoma-chamber.

For the microscopical analysis we are indebted to *Dr. Irvine Fortescue*, lately Offg. Curator of the Royal Herbarium, Calcutta.

the *Furcræa gigantea* of *De Candolle* (*Plant. Succ. Hist. 126*) or the *Agave fœtida* of *Jacquin* (*Ic. Pl. Rar. F.* 379) which are apparently the same as *Plukenet's Aloe americana radice tuberosa fœtida minor non spinosa, Phytog. t. 258, fig. 2; Almag. p. 19*, because the leaves of the plant figured by these authors are described as fetid. Nor does it agree with *F. gigantea*, Baker (*Gard. Chron. N. S. xi. (1879) p. 623*) because the leaves of his plant have brown pungent points, whereas in our plant the point is green, blunt and not at all pungent. Further, the leaf of *Baker's* plant is described as much thinner in the middle, one-eighth of an inch, as against five-eighths to three-quarters of an inch in our plant. What appears to be the *Agave fœtida* of Linnaeus is in cultivation as a hedge plant in the Calcutta Garden, and is manifestly distinct from either of the species reputed to yield marketable fibre in India.

FURCRAEA. Species 1 Nomenclature.

Agave fœtida.

Furcræa sp. 2

FURCRAEA Species 2. described.

Leaf sharply constricted above the base, light green, surface plaits obscure, tip cartilaginous ending in a small but distinct slightly recurved yellow brown spine about $\frac{3}{10}$ in. long; branches of flowering panicle spreading, perianth segments linear-lanceolate, obtuse, white, externally greenish with faint darker stripes within, anthers rounded, filaments about four-fifths of an inch long, dilated, at the widest about $\frac{1}{8}$ of an inch broad; otherwise, so far as the material goes, very close to the preceding.

India: Mysore; *Butler*!

By *Baker's* description this should be his *F. gigantea*, and it is evidently the same as *Wight Icones* 2025. It seems doubtful whether *F. Commelynii* Baker be the same as *F. Commelynii* Salm Dyck, which indeed seems to be the *Agave foetida* of *Linnaeus* and the *Furcraea gigantea* of *Ventenat.* The "*Mauritius Hemp*" of South India therefore cannot be with propriety spoken of as *F. gigantea.*

REMARKS ON CERTAIN SPECIES KNOWN IN INDIA.

Indian economic writers have been constrained either to class the different "**Aloe fibres**" all under one head, or to classify them roughly under provisional names such as "*americana*,"—

AGAVE SPP. Indian species have not been fully identified.

"*vivipara*," etc. (*Royle, Fibrous Plants of India, London 1855, pp. 41-50: Watt, Dict. Economic Products, Vol. I, pp. 133-44.*)

Royle was aware

Royle was aware (*Ill. Himalayan Botany, p. 374*) that several species of **Agave** were naturalized in India, and he gives *Banskeora* as the vernacular name of "*A. vivipara*"; but in his Report on Indian Fibres he did not attempt to discriminate between the species from which fibre was taken for the experiments detailed in his work, the reason obviously being that no one could say what plant was used for any given experiment.—

Watt made it obvious.

Sir George (*then Dr.*) *Watt* (l. c.) writes as follows,—

* * * * *

"*At the present moment it is next to impossible to arrive at any definite knowledge regarding the species and varieties cultivated for their fibre.*"

* * * * *

"*An important step would be taken were the fibre-yielding plants to be carefully referred to their respective genera. The account of A. americana in the succeeding pages should be viewed more as Aloe fibre plant since it seems probable that the name A. americana is popularly given to a series of species and varieties yielding allied fibres.*"

The first step indeed towards developing the "**Aloe fibre**" industry in India, is to ascertain as accurately as possible what are the species of **Agaveæ** that are already naturalized or cultivated for their fibre, and it is to facilitate this that the present paper has been undertaken. When we know what is already growing in the country, and how different species thrive in particular tracts, the proper authorities will be in a position to deal with the economic history and capabilities of the different species, and to advise as to the encouragement of particular kinds in different localities, or the introduction of new sorts, just as **Agave sisalana** was brought in through the efforts of *Sir George King*, thus reviving the public interest in these products, which was weak or dormant so far as India was concerned since the work of *Roxburgh* was closed in the beginning of the last century.

Why the identification has been left so long.

Living plants of this family are not always easy to describe or identify, while their classification by means of herbarium specimens has been so far found to be impracticable. The bulk and habit of the plants,—the similarity of some

forms in their earlier stages,—above all the long and uncertain period of maturity which marks all the **Euagaves** and most **Furcræas** have proved serious impediments to the study even of living **Agaves** through public and private collections in Europe and America. It is hardly surprising, therefore, that the botanical information should be imperfect (*cf. Zuccarini Pl. Nov. vel Min. Cogn., Fasc. I., Ratisbon 1832, p. 42*).

AGAVE PRODUCTS.

Early Travellers to America made acquaintance of plants,

As regards the history of the economic species there is much to be found in the great work of *Martius* (*Flora Brasil. Vol. III., pars I, pp. 190—197*). Following him largely, we conclude that the early European voyagers to the West India Islands found the existing occupants getting sundry products from different **Agaveæ** and **Bromeliaceæ** and that certain kinds were famous for their fibre, which was worked up into various commodities such as thread, coarse twine, nets, bags, and cordage. "Floss" or tow was got from the leaves of a kind which was known to the English adventurers as "*Silk grass.*" The dried tissue (medulla) of the flowering stem served for tinder; while a kind of paper,—or rather parchment,—was prepared from the same leaves that produced fibre for string-making. From the "floss" cloth was woven. The leaves of some species contain a detergent mucilage and both these and the roots were ordinarily used for the same purposes as soap until quite a recent period in the West Indies. (For medical uses *Martius* (*l.c.*) and other authors cited by him may be consulted.)

they found sundry products to be obtained by Haitians and Caribs from them.

PRODUCTS AND VERNACULAR NAMES OF AMERICA.

Early Accou

Martius believes that the fibre plants and their products were alike known to the Haitians comprehensively as "*Henequen,*" the corresponding term in the Carib dialects being "*Pita,*" and he suspects that the Carib Indians took at least one of the **Furcræas,**—and the name *Pita,*—to the shores of S. America.

Henequen.

Pita.

From *Peter Martyr's* account of San Domingo it would seem that the word "*Maguei*" or "*Manguai*" also belonged to the native language of Haiti. Be that as it may, the Spaniards took the names *Pita* and *Maguey* with them to the mainland, and applied the latter to species of **Agave** which they found abundantly cultivated on the table-land of Mexico for the sake of the saccharine juice which the leaves distil when cut just before "poling." The plant was known to the Aztecs as *Metl* (a generic term) and the liquor as "*Octli.*" Fermented to a kind of cider (with the addition of a herb known as

Maguei or manguai.

Metl.

AGAVE PRODUCTS.

Ocpatli)*, it was, and is, the national beverage of Mexico—"*Pulque*" or "*Pulco*". A spirit is said to be made from the same secretion, and known as "*Aguardiente*," i.e., "Firewater."

Pulque.

Aguardiente.

Caraguata. Karato or Curaça.

Another name, in the Islands especially, was *Caraguata*, *Karato*, or *Curaça* which applied particularly, it would seem, to the **Furcræa tuberosa**.

Pati.

"*Pati*" according to *Hernandez* was the Mexican name for a *Metl* which produced the finest fibre, or tow, and was probably the mainland equivalent of "*Henequen*."

The term "*Pita*" has spread over the world and has been embodied even in the dialects of S. India.

Sources of pulque.

Recent American investigations have shown (*J. N. Rose in Contrib. U. S. National Herbarium, Vol. V. p. 223*) that there are several species of **Euagave** which yield "*Pulque*," but the principal appears to be the **A. atrovirens** of *Baron Karwinski*, which is identified by several continental botanists with *A. Salmiana* of *Otto*. From the descriptions as well as from photographic illustrations that accompany *Mr. Rose's* paper, this form must be closely allied to *A. lurida H. B. C.*, but abundantly distinct from **A. americana** of *Linnaeus*. As regards spirit yielding **Agaves**, *Mr. Rose* states that the spirit is now called "*mescal*" or "*tequila*," and he adds "*while it is uncertain from what species tequila is made, it is at any rate not A. americana.*" *Sotol*, another alcoholic preparation which the traveller *Lumholtz* derived from a plant "of the same family as *A. americana*," is produced, not from any **Agave** at all, but from a **Dasylirion**. *Hernandez* figures a "*Mexcal*" that looks like the "*Agave Gilbeyi*" of gardens; which is not an **Euagave**.

Sources of Mescal or Tequila

Sotol.

Mexcal.

Ixtli, istle or Tampico fibre.

One other native term requires mention, viz., that of *Ixtli* or "*Istle*" which is often applied to the plants that yield the product known commercially as "*Tampico fibre*" from the town of export. Recent information as to these will be found in *Mr. Rose's* "*Notes on Useful Plants of Mexico*" (*Contrib. U. S. National Herbarium, V. p. 242*) already quoted, as well as about other fibre plants of Central America, but the fact is that there is not a single fibre-yielding species of the **Agaveæ** or **Bromeliaceae**,—to say nothing of **Yucca**,—that can be said to have been as yet sufficiently identified.

* In a recent publication this is said to be **Datura Stramonium** Linn., which is improbable; though it may be some other species of **Datura**.

AGAVE PRODUCTS.

"*Tampico*" or "*Lecheguilla*" fibre, however, is believed to be got from species that do not belong to **Furcræa** or **Euagave**, and its chief interest for Indian workers lies in the circumstance that "*Ixtli*" has been also reported as a name for certain Yucatan species of **Agave**, with this consequence (among others) that the well known "**Sisal Hemp**" (cultivated in the Bahamas and the British East Indies) appears in some botanical works as a variety of *A. Ixtli* Karwinski or of *A. Karwinskii* Salm. As the descriptive list of species will have shewn, we propose to call the true **Sisal Agave** of Florida and India **A. sisalana**, *Perrine* (ex Engelmann) or more briefly **A. sisalana**, *Perrine*.

The species included in our brief Descriptive List are not of course of equal economic value: **A. americana** *Linn.* is not naturalized apparently in any part of India, but is grown in gardens and about houses as an ornament, the particoloured kinds being in vogue chiefly. Small articles have been made from its fibre as curiosities, or for exhibition purposes, but this species does not seem to be grown or utilized for economic purposes in India, or indeed anywhere. When "*A. americana*" is spoken of as a "*Fibre Aloe*," some other species almost always is intended.

There is a widespread idea that there is quite a number of varieties of "*Agave americana*." There are several variations of the leaf, *e.g.*, with white bands along the edges, or a white stripe down the middle, due to the industry of horticulturists, but,—like other **Euagaves** so far as we have seen,—the essential characters of this well known garden species are particularly constant.

The native country is unknown (*A. De Candolle, Geograph. Botanique, p. 983*), but may be in the W. India Islands.

As regards the fibre of **Agave D.**, *i.e.*, **A. Vera-Cruz** *Miller*, (= "*A. turida*" of the *Calcutta Garden*) we have practically no information. We believe that this is the **Agave** which is naturalized on a great scale in S. Europe and N. Africa; in S. Europe it is often called "*Agave americana*," and it was most likely the "*American Aloe*" of the earlier writers till *Linné* appropriated the specific name for the garden plant of N. Europe. In India it is established as a hedge plant in Bengal and S. India; there are specimens from the Bombay neighbourhood also, but how far it may have run wild on that side

AGAVES IN INDIA. of India remains doubtful. It occurs with other **Agaves** throughout the Gangetic Plain as far north as Cawnpore but **A. vera-cruz.** usually though not always planted. Further to the north and west it seems little known and we suspect that the climate of Hindustan and the Panjab is not well suited to it. In the Royal Garden at Sibpur, where it was introduced by *Lord Auckland* when Governor-General in 1836, this **Agave** luxuriates. Its range in Europe (under the continental name of "*Agave americana*") is shewn in an account and chart in *Gartenflora* 1875 by *H. Hoffmann** (*p. 70 and t. 825 No. 1*).

Unknown origin. Sharp frosts are evidently fatal to it, unless it is artificially protected. This might be expected if it was the plant which *Schiede* and *Deppe* saw wild in the country between Vera Cruz and the table-land of Mexico (*Linnaea, IV pp. 208, 582 etc.*) but the brief description of that rather suggests **A. Wightii.**

AGAVE species C. The reasons for giving **C** a place in the Descriptive List will be found under Part II, where it is suggested that this handsome species (formerly named "*Jacquiniana*" in the Saharanpur Garden) may be *Karwinski's* **A. atrovirens** or some closely allied form.

Agave Cantala perhaps first to reach India. An important point about the next species in the List (E. = **A. Cantala** *Roxb.*) is that though utterly distinct from **J** of the same = "*A. vivipara*" of *Wight,* (in place of which we recommend the name of **A. Wightii,**) it has nevertheless been very frequently confused with it, as will be explained more fully in Part II of this paper. **A. Cantala** appears to have been the first **Agave** to reach the East Indies, which it did most likely from the Pacific Coast of Central America. It is well figured in *Rumpf's Herb. Amboyn.*, and that illustration is quoted by *Roxburgh* as applying to his **A. Cantala,** which he supposed to be a native of India.

Distribution. This seems to be a common hedge plant near Bombay, in the north of Madras, and in the Gangetic Plain, and extends

* He includes certain stations of flowering in the open in Brittany and the S. W. of England which are usually given to the true *A. americana,* but it is quite possible that the plants which flowered there were *A. Vera-Cruz. A. americana* seems to be much hardier, as *Miller* has noted. The variegated specimen (see *Sir W. Hooker's* note in Sims) from which plate 3654 Bot. Mag. was taken flowered at Aikenhead in Scotland.

In August 1901 *A. americana* Linn. flowered in the open at Kingcausie, Maryculter, Kincardineshire in the N. E. of Scotland (*Dr. Irvine Fortescue*).

into the submontane Districts of the Agra Province and the Panjab.

AGAVE IN INDIA.

Fibre has undoubtedly been extracted from this species on a considerable scale, but opinions on its quality are conflicting.

Agave Cantala a fibre plant.

In the Dehra Dun and in the Panjab Siwaliks still another **Euagave** occurs in a half-wild condition from which a good fibre has been got for certain purposes, and the same has been planted on a marketable scale in the dry tract between the Chambal and the Jamna. This was sent to the Calcutta Garden as *A. mexicana*, but as will be seen under Part II, *Lamarck's* "*mexicana*" is not a good species, and the rules of nomenclature debar the reapplication of the title to a different species. We have not been able to identify the species clearly with any named **Agave** of which we have the description, and it has therefore to appear in the Descriptive List anonymously as **Agave "F."**, but it is pretty certainly the same as a species which blossomed in London in 1849 and was doubtingly referred by *Moore* to the *A. mexicana* of Haworth (which is *not* that of *Lamarck*).

AGAVE species F. also a fibre plant.

"**H**" is a fine **Euagave** which occurs in several parts of Bengal and the Gangetic Plain as far North as Saharanpur, where it has run wild in the Botanic Garden, and is known, but incorrectly, as "*A. lurida*." There does not seem to be any record of experiments with the fibre of this species, but the late *Mr. Gollan*, who had extracted it, informed us that it is of good quality so far as he could judge, and that the leaves are easy for the work people to handle.

AGAVE species H.

It flourishes under the same conditions as **A. Wightii**, and the two, though otherwise strongly dissimilar, are often found in the same hedge, though not necessarily planted out at the same period.

This has the largest leaf of all the **Agaveæ** hitherto observed in India attaining 7 to 8 feet and over, with a corresponding breadth, though the leaf is narrower proportionately than in **A. Vera-Cruz** for example. We are disposed to refer it to the **Sisalana** group of **Euagave**. There are specimens from Madras, which we had placed under this species, but they seem poorly developed in comparison with those from N. India.

The largest of all Indian Agaves in leaf.

We have not yet mentioned the first species in the List, viz. **A**, which differs from all the others by the margin of the leaf.

AGAVES IN INDIA.

It is included because the Saharanpur plant is possibly the same as a form received in the Sibpur Garden from Burma, and said to be naturalized in that country. Very little is known of this **Agave,** which is also unidentified; further remarks upon it will be found under Part II.

Agave species A.

Agave Wightii.

The last naturalized **Euagave** in the Descriptive List is a well-known form in Southern, Central, and North-Western India. In the N. W. it is looked on (as **A. Cantala** is in some parts of India) as "*desi*," or "native," but this means no more than that it spreads itself without the direct aid of man, and that there is no current tradition of its introduction. This species should be recognized easily by its round compact rosette, by the rather pale tint of the leaves, and their stiff habit. It is the only **Agave** in North India moreover that develops a conspicuous trunk, though this does not always happen.

~~It may develop a stem.~~

The division which has sometimes been adopted of **Euagave** into two groups of "*caulescent*" species and "*stemless*" seems inconvenient. The same species may under one set of conditions, or at a particular stage of its development, appear to be stemless and yet develop a conspicuous stem or "*caudex*,"—somewhat on the plan of a small **Palm** or a **Yucca,**—at a later period or under altered surroundings. The truth seems to be that all the **Euagaves** have more or less of a stem above the crown of the rhizome though it usually is concealed by the outer leaves in most of them. At the same time certain species are more apt to develop a manifest trunk than others, although no known **Agave** attains in this respect the stage arrived at by one of the **Furcraeas** (**F. longaeva** *Zuccarini*). Probably the "caulescent" species shed their outer leaves periodically, pushing up the vegetative cone with more rapidity than the so-called stemless forms, so that the portion of the trunk which has shed the older leaves is large and conspicuous.

Wide spread in India.

At all events this is something like the process which takes place in the species figured by *Wight* as "*A. vivipara*" (l. c. 2024). This well-marked **Agave** is that most widely spread in the drier parts of India, from Mysore to the Panjab, though from many intervening parts it has not been reported. It extends to the very south of India and east to Bengal and Assam, but does not thrive well in a damp climate. *Wight,* following *Buchanan* probably, referred his plant to the

"*vivipara*" of the *Species Plantarum*, but that is an utterly ambiguous species not founded on living or Herbarium material so far as we can discover, and the proper course is to drop the name altogether. *Miller's* "*viripara*," which may be the "*vivipara*" of some continental authors, is obscure, but it was certainly remote from the plant of *Wight* and *Buchanan* and we have proposed **Agave Wightii** accordingly. AGAVES IN INDIA.

There remains only "**G**" of the Descriptive List, the "**true sisal**" which was introduced into Bengal some twelve years ago, as explained in *Bulletin* No. 5, 1899 of this Department **(Agave sisalana).** Agave sisalana. Introduction in Northern India.

Under Part II, the history of this staple in America is fully considered, and reasons stated for re-placing the present scientific name ("*A. rigida*, var. *sisalana*") by **A. sisalana** simply, as was done indeed by *Col. Prain* in the Bulletin just quoted.

About the same time that the Bengal Government was bringing "**Sisal**" into N. India, it was being introduced into the Mysore State as set out in an interesting note by *Mr. Cameron*, Superintendent of Government Gardens, Bangalore, from which an extract is subjoined as follows:—

Introduction into Mysore.

> "Acting on my advice, and kindly assisted by the authorities at Kew, the late Mr. Ricketts was able, in 1892, to import 5,000 plants direct from Florida. Prior to this date a few plants of *Agave rigida* had found their way into the Botanical Gardens, but it is quite impossible that the variety *Sisalana* had ever appeared in the Province before. We may therefore take 1892 as the starting period of this important cultivation.
>
> "The plants from Florida arrived in excellent condition and were at once planted out in the Lal Bagh. In view to hardening them off and inducing them to reproduce their kind, it was decided to plant thickly in an open field which had formerly been cropped with ragi and other dry crops. The bulk of the consignment was therefore laid down in a plot of land measuring only $\frac{1}{8}$ of an acre. With exception of occasional thinning out to relieve congestion and meet small indents, the original plants still remain in this position where they form an overcrowded and conspicuous clump. Suckers were

AGAVES IN INDIA.

SISAL. Introduction to Mysore.

allowed to grow and the matured leaves of parent plants have not been cut, hence poling commenced in the 9th year, or in 1901. Poling or the growth of the floral axis, forming flowers, fruit, seed, and adventitious buds, renders propagation easy as each pole gives birth to upwards of 2,000 buds, which shortly develop into bulblets that mature and fall to the ground.

"It will thus be seen that the main object of cultivation in the Lal Bagh during the period under report has been to induce poling and render the plants hardy. We shall now have ample material to commence cultivation for another object, if desired, viz., to produce Sisal Hemp, the valuable product of the leaf. During the current official year 45,000 plants have been sold for that purpose, at a cost of Rs. 1,000; a sum which more than twice covers the original outlay for introducing the species from Florida.

"In my opinion, cultivation should be left to private enterprise, though in the case of arid tracts where ragi often fails to reward the raiyat, it may be feasible to substitute a crop of the kind. But that could only be done when a real demand for hemp arises at convenient centres. The advantages of the cultivation may be briefly stated as follows:—

1. Land of a gravelly and stony nature is suitable.
2. When land is planted up, the cultivation practically ceases for a period of 4 years, or until the matured leaves are ready for cutting.
3. On suitable land failure of crop has never been heard of.
4. The profit on an acre of land yielding crop is estimated at £4 to £5 per annum, that is 60 to 75 rupees.

"The large succulent growth obtained in rich land is inimical both to the quantity and quality of fibre produced; therefore somewhat poor land of a loose

AGAVES IN INDIA.

SISAL. Introduction to Mysore.

stony nature is always preferred, as in addition to giving better results generally it accommodates a larger number of plants to the acre. Mysore possesses plenty of such land, and if the latter can produce leaves of four feet in length it will do. But there is a reduction in value, as well as difficulty in extracting the fibre, when the leaves are under three feet in length. In Yucatan, plants are put out in rows at 7, 8, 9 and even 12 feet apart, according to the nature of the soil. But the general practice is to allow nothing under 400 plants to the acre, while 660 is considered about the maximum number. In the Bahamas the planting is somewhat closer. When a plantation is once established it may be profitably worked for a life time, care being taken not to let the plants pole or become exhausted from over-cutting. In a large plantation drives are left at convenient intervals to facilitate the easy removal of leaves."

* * * * *

Recent information on the growing of A. **sisalana** will be found in the Year Book of the United States Department of Agriculture for 1903 (*Washington 1904, pp. 395—396*).

FURCRAEA IN INDIA.

The only **Furcraea** that is grown on any scale in India is the "**Mauritius Hemp.**" This is established in the extreme S. W. of India; in N. India it has recently been used for fibre with other **Agaveæ**; but it is not known to what extent it is in cultivation for this purpose; the identification of this species is considered in the Descriptive List under **Furcræa.**

SUMMARY OF USEFUL SPECIES IN INDIA.

To sum up as regards Indian economic species of **Agave**, those at persent known are E,—F,—G,—J of the Descriptive List;—

E. is **Agave Cantala** *Roxb.*

G. is **A.——sisalana** *Perrine.*

J. is **A.——vivipara** *Wight*, which we have called instead **A. Wightii.**

"**F**" unfortunately is without a name for the present. It seems intermediate between **A. Cantala** and the **Sisalana** series, and would probably repay investigation.

SUMMARY OF USEFUL SPECIES IN INDIA.

We suspect that "**H**" (the large species wrongly called "*lurida*" at Saharanpur) is also allied to the **Sisalana** group,—and careful experiments upon its fibre are very desirable.

"**J**" will doubtless hold its own as a hedge plant, especially in the drier provinces, but the shortness of the leaf handicaps it as against other species.

We know nothing really about **A. Vera-Cruz (D)** as regards its fibre, but the prickly margin of the leaf has to be reckoned with. This species stands a moist atmosphere rather better than **A. sisalana** possibly, but the species "**H**" is perhaps the most adaptable to varieties of climate. We do not pretend to offer an opinion as to soils for planting **Agave**, but botanical considerations, as well as experience in the different gardens, suggest that the composition of the soil is not of much importance,—always provided it is well drained and sloped, or elevated sufficiently to guard against water-logging. An important factor, of course, in the cultivation of **Agave** or **Furcræa** is the provision necessary to meet the effects of poling; but where space is available this can be met by marking out the plantation into blocks, and planting these on a fixed working plan in successive years, so as to maintain a continuous supply of leaves of the proper age from the different blocks in rotation.

In a letter from the State of Vera Cruz the following remarks on the native soil and climate of the **Agaves** occur:—"In our rich clay loams here with 125 inches of rain distributed over nearly nine months of the year—as might be expected—Agaves are non-existent," but it is added, that "on the Pacific side of the Isthmus, * * in the State of Oaxaca, where the rainfall dwindles away to 30 or 40 inches with over eight months' dry season, and a gravelly or rocky soil, I have observed Agave and Cacti in abundance." This lends confirmation to Mr. Cameron's suggestions; but the merit of such situations probably depends on their facility for drainage.

Our reasons for including "**K**" in the List will be found in the following Part (II) of this paper. It is the **A. decipiens** of *Mr. J. G. Baker* which is possibly the same as **A. Ixtli** of *Karwinski* and is known in Florida as "**false Sisal.**" It is only known in India in Botanical collections at present.

PART II.—HISTORICAL AND SYSTEMATIC.

AGAVES ARE AMERICAN.

The genus **Agave** was founded by *Linnaeus* on a species which he introduced into the University Garden at Upsala. From an MS. work of his in Swedish, printed at Upsala by T. M. Fries in 1899, it appears that a specimen of the plant which he afterwards described as *Agave foliis spinodentatis mucronatisque* in the *Hortus Upsaliensis* (*Stockholm, 1748, p. 89*) flowered at Noor between Stockholm and Upsala in 1708 and in this MS. ("*Hortus Uplandicus*") *Linnaeus* identifies the plant that flowered at Noor with the *Aloe ex America* of *Dodoens* and the *Aloe folio in oblongum aculeum abeunte* of *Tournefort.* These synonyms among others are given in the *Hortus Cliffortianus* (*Amsterdam 1737*) for the plant to which he subsequently gave the name of **Agave americana** (*Sp. Pl. ed. 3, 1764, Tom. I. 461*). We will return to the **Agaves** in Clifford's garden later, observing meantime that when first imported into Europe from the New World, **Agaves** were classed by the science of the day with the *Aloe* of *Dioscorides* (or "*Bitter Aloe*") owing to the similarity of foliage.

Some have questioned American origin.

It has been questioned (*Bertoloni Fl. It. IV. 151, also Visiani Fl. Dalmat. I., 124*) whether the **Agave** which has become widely naturalized in S. Europe was in fact imported and not actually indigenous; but the evidence against any **Agave** being a native of Europe is overwhelming.

The ingenious argument of *Ernst Meyer* (*Bot. Zeit. 25, April, 1856*) turns on a drawing made in the 15th century, or earlier, of a plant said to occur in India, Persia, Greece, and Apulia in a work on Simples composed by one *Mathias Platearius*, principal (in the 11th century?) of the Medical School at Salerno founded by Charlemagne; but it is difficult to distinguish figures of *Aloe* and *Agave* in the old authors when, —as *Herr Meyer* states was the case with the Salernian drawing, —no inflorescence is given. Probably a species of *Aloe* introduced by the Saracens into S. Italy was intended. The **Agave** is known in Calabria and Sicily by different names, of which one at least is derived from the Arabic "*Sabare*" * which is still the designation of the *Bitter Aloe* in the North of Africa.

* From a root meaning (inter alia) "to turn sour or bitter," or from a derivative that means "arid rocky places," which the best medical Aloe inhabits.

AGAVE. ITS ~~LIMITS~~ IN AMERICA.

That the genus **Agave** has its head-quarters in the New World is quite certain. *Mr. W. B. Hemsley* (*Introduction to Biolog. Centr. Amer. App. p. 272*) gives the range of the true **Agaves** as from Texas and Arizona on the North to Southern Mexico, with outlying representatives. He further indicates that the type diminishes as one passes out of Central into S. America.

If the group of which **Agave virginica**, *Linn.*, is a type be not made a separate genus (**Manfreda** *Salisb.*) then the north-east limit of **Agave** would be found in the State of Virginia, the most southerly record being one which may be translated as "at the bottom of warm cañons in the province of Huanaco in Peru" (*Ruiz and Pavon. III, 66-67*) that is about nine degrees south of the Line in 75° W. Long.

Humboldt. ~~does not say that they are wild over the whole of Trop. America.~~

The authority of *Humboldt** has been long quoted for the statement that his *Agave americana* extends over the whole of tropical America to 7,600 feet from the sea level, but the student has as a rule been left to discover for himself that the **Agaves** which *Humboldt* observed abundantly in Central America were always cultivated, that (as he expressly states) there are several varieties in Mexico, also that the **Maguey** of the Spanish colonies included several sorts, some of which (for reasons given in his text) probably belong to other genera.

All this is very clear from *Humboldt's* own writings, but, as the point is of importance, we may add the testimony as to S. America of *Martius* (*Flora Brasiliensis*, III. 1. p. 18[illegible]) that the *Agave americana* was not even cultivated in Brazil in his time except in gardens or about mansions (*Cf. also W. B. Hemsley loc. sup. cit., p. 273* for remarks on the distribution of **Agave** and **Furcræa**).

Humboldt remarks that the several varieties of the "**Agave americana**" constitute the **Maguey** or **Metl** of the Aztec-speaking peoples. **Metl** evidently was a general term applied to different **Agaves** (and **Furcræas**) as well as to certain useful plants of the Pineapple Family (**Bromeliaceæ**). This appears from *Hernandez* (*Rer. Med. N. Hisp. Theasaurus a Nardo Anton. Recchо Collecta, etc., Romae 1651*). *Hernandez*, who was body physician to Philip II of Spain, had spent a

~~GROWTH OF EUROPEAN KNOWLEDGE.~~

Hernandez.

* The most important statement is in the "*Essai Politique*" and is translated at some length in the letterpress to plate 3654 in Curtis's Botanical Magazine, Vol. XII, N. S. 1839.

great part of his earlier life in the Mexican possessions, and was manifestly a close and intelligent observer.

AGAVE. GROWTH OF EUROPEAN KNOWLEDGE ON MAGUEY.

The *Thesaurus* (Cap. XII) gives about twenty different sorts of *Metl* with woodcuts of nine which, though rough, are usually good, but in the case of "*Maguei*" the inflorescence seems to have been added wrongly, as the flower is not that of an *Amaryllidea* at all or indeed attributable to any allied order. This is repeated by *Morison* (*Plant. Hist. Oxon. ed. 1680 p. 417 and t. 22 Sect. 4*), for his "*Aloe* (3) *americana flore luteo.*" His letterpress is largely taken, as regards the "American Aloes," from *Hernandez.*

16th Century.

The earliest mention of the **Maguei** that we have been able to trace is attributed to *Peter Martyr* (*De Rebus Oc. et Orbe Novo, Basel*, 1533) as quoted by *Martius*, l.c., p. 192 and by *Danielli, Nuovo Giorn. Bot. Vol. XVII, Fasc.* II, *April 1885.*

Peter Martyr.

Peter Martyr seems to have known the plants, which were produced in San Domingo; he compares them to palms, and says that the inner leaves were eaten by the natives. He further states that the name in the Haitian language signified a drum (or cymbal?). In the older books it is noted that a kind of parchment or paper was made from the leaves of **Agave**, so it is possible that *Peter Martyr* was mistaken, and that the tambourines of the Haitians were called after the **Agave** and not, as the quotation suggests, the plant from the instrument.*

Oviedo (v. *Martius*, also *Danielli*, ll. cc.) in the 16th century mentions at least three kinds of fibre-yielding plants of the West Indies, viz.:—

Oviedo.

(1) **Henequen**, (2) **la Cabuja**, (3) **Maguey.**

Martius (*Beitrag zur Natur-und Literatur-geschichte der Agaveen*) has gone fully into *Oviedo's* account and regards four species as indicated; he concludes that the **Maguey** Agave was not "*A. americana*" (of *Humboldt* and others) but a species of the Islands which he specifies as "*Agave vivipara.*" He quotes a passage in which *Oviedo* refers to the Maguey of the Mainland, and this seems to support the conclusion that the species of the Islands from which soap and fibre are obtained differed from the Maguey of Mexico.

From 1568 to 1572 an Englishman named *John Chilton* travelled over nearly the whole of Central America and in his

Chilton.

* *Zambarone*, one of the names of **Agave** on the Adriatic littoral, which is usually regarded as a corruption of the Saracenic term already mentioned, looks more as if it might be derived from the oriental name of the Kettledrum or Turkish cymbals (Zambúr). The Apaches (Northern Mexico) use the central shoot of a species of *Agave* for making fiddles [Miss. Gard. Rep. VII p. 58].

AGAVE, ~~GROWTH OF EUROPEAN KNOWLEDGE OF~~ MAGUEY.

account (see "*A notable Discourse, etc.,*" *in Hakluyt's Voyages, London, 1598, Vol. III., p. 462*) it is noted that, "*about Mexico and other places in Nova Hispania there groweth a certain plant called Magueis which yieldeth wine, vineger, hony, and blacke sugar, and of the leaves of it dried they make hempe, ropes, shooes which they use, and tiles* for their houses, and at the end of every leaf there groweth a sharp point like an awle, wherewith they use to bore or pearce thorow anything.*" Hawkes.

Hawkes, a merchant who resided in New Spain about the same period (*l.c.* p. 463) also mentions the "*Magueiz*" as the source of a wine which is called "*Pulco.*" In 1601 *Hakluyt* published a translation of the "*Descobriomentes*" (published 1563) by *Antonie Galuano* who was Governor of the Portuguese East Indies in the earlier half of the 16th century. This contains a full account (among other wonders of New Spain, such as the Humming Birds) of the **Metl** or **Honey Tree,** which is unmistakeably the **Maguey** or **Metl**† of *Humboldt.*

Galuano.

Lopez.

F. Lopez de Gomara (author of the *Life of Cortes*) gives a similar but more exact account of the *Metl,* adding that the Spaniards call it *Cardon.*

Acosta.

In his *General History of the Spanish Indies* published about the same period *Acosta* (*v. Danielli, l.c., p. 68, quoting Martius*) describes "*El Arbor de las Maravillas es el Maguey*" as a *Peruvian* species differing from that of New Spain (*i.e.* Mexico).

~~One Maguey or Metl in one place another in another.~~

From these different histories it is clear that one kind of **Maguey** was known in San Domingo and other West Indian Islands from the time of their discovery by Europeans, and that different plants, probably **Agaves** or **Furcræas,** which were employed for various economic uses on the mainland were identified with the Island kinds by the Spanish ‡ conquerors, of which the best known was the wine-producing **Metl** of the Mexicans. As has been noted, however, there were several kinds **of Metl.**

---

* This use is noted in the *Canaries,* where **Agave** is naturalized, by Leopold von Buch (*French translation of Chap. IV. of the main work reprinted from Archives de Botanique after* 1817).

† The early writers, whose etymology was comprehensive, clearly connected this Aztec appellation with the "honey" which distils in the perianth of different species of Agaveae.

‡ This was written before we had seen Martius' "*Beitrag, etc.,*" in which he arrives at a similar conclusion.

AGAVE, APPEARS IN S. EUROPE.

The Spanish conquests in Central America were established by the year 1525 and not long afterwards at least one species of **Agave** had appeared in S. Europe.

16th Century.

Charles de Lecluse (*Clusius*) while travelling in Spain about the third quarter of the 16th century saw a plant growing in a convent garden near Valentia, which he has described as *Aloe americana* (*Rariorum Stirp. per Hisp. 1576*; also *Rar. Pl. Hist. Antwerp, 1601, p. 160*), and identifies with the *Metl* or *Maguey* of *Gomara*, whose account he incorporates. *De Lecluse* took offsets from the convent specimen (which had not yet flowered) and sent one of these to a friend's garden in the Netherlands. *M. Charles Martins* (*Bull. Soc. Bot. de France, II., p. 9*) notes that the woodcut in the *Historia* was taken from the specimen that was sent to this friend and that this subsequently flowered at Antwerp. This figure gives a fair representation of an **Agave** of the type of *Humboldt's* "*americana*."

Clusius found it in Spain, sent it to Netherlands.

Almost simultaneously or a little later, *Caesalpino* saw an **Agave** in flower in the garden of the Bishop Tornaboni, probably near Pisa, which is eloquently described in Cap. XXXII of his "*De Plantis*" as "*Alterum genus* [viz.: *Aloes*] *ex India Occidentale advectum etc.*"

Caesalpino. Found it in Italy.

Danielli says, with much justice, of the accounts which occur from this period with increasing frequency of "*Aloe americana*" having flowered at such and such a spot in Europe, that it is impossible to say which of the species of **Agave** (Sect. *Euagave*) was seen by the observers; but *Caesalpino's* excellent description suggests that the specimen he saw was not **A. americana** of *Linnaeus*.

~~These cannot be identified~~

Cortuso, Superintendent of the Botanic Garden at Padua, had an **Agave** in cultivation before 1561, which is said to have been the first introduced into Italy (*not* Europe, as by a slip,—often pointed out,—was stated in the *Species Plantarum*).

Cortuso, grew one in Italy.

The story that the **Agave** first flowered in Europe at the papal city of *Avignon** in South-Eastern France in 1599, seems to rest upon a pious opinion, of which the genesis can be divined by consulting the original authorities (for references see Danielli, l.c., pp. 84—85, and Ch. Martins, l.c., 9 to 11).

France, ~~received plan probably from Italy.~~

* *Danielli* notes that the **Agave** was probably taken by Italians settled in Avignon to that city from Tuscany. In a French work on the plants of the Trianon garden it is said that "A. americana" was first brought to Paris from the Mauritius in the 17th century.

AGAVE SPREADS IN EUROPE.

An account by *Pierre Borel*, a Languedocian who was some time physician to Louis XIV (*"Hortus * * * cum accurata descriptione, etc.," Castries 1666 Paris 1669*) has been the source of sundry evergreen traditions about *"Agave americana."* Borel is quoted in the *Historia Plantarum* (*London 1686, p. 1198*) as follows:—

Borel had it near Montpellier; his account of its polling.

"Petrus Borellus Aloe plantæ caulem cum per longum tempus sine eo remanserit tandem erumpere scribit cum fragore et strepitu ut impetu facto tota in truncum fere convertatur coram mirantibus hominibus incrementum tantum suscipere ut etiam Quercum mediocrem aequet et 30 circiter palmaram altitudinem, et femoris crassitiem acquirat, floribusque in summitate decoretur. Quodque magis mirandum intra paucos dies [quatuor vel quinque] hanc molem attingere, adeo ut incrementum ejus etiam oculis percipi potuit. Tale quid visum nuper apud Monspelienses etc. credat Judaeus Apella."

The last three words are not, of course, in Borel but are *Ray's* comment, and produced later dissertations; but the facts collated by *M. Charles Martins* (of Montpellier), *Danielli* and others shew that the flowering of different species of **Agave** (Euagave) in Europe may be delayed from the sixth to the eighty-second year of the life of the individual offset.

Borel's specimen flowered at Pezénas near Montpellier during 1641 and the then King of France with Cardinal de Richelieu and the whole Court went to view it. This climate is that, in all Europe, perhaps most congenial to the **Agaveae**, and in the adjoining Sub-Pyrenean County of Rousillon, more especially about Perpignan, an **Agave** is naturalized on a great scale. (*Le Grand in Bull. Soc. de France, XVII, p. 95.*)

Camerarius boldly considers to be one Clusius' plant of Spain and Netherlands, Tuscan plant, and Linnaeus A. americana.

Bock (*Tragus*) about 1552, and *Mattioli* in the 1563 edition of the *Kreuterbuch* make no allusion to any plant that could be an **Agave** or **Furcræa**, though they deal fully with *"Aloe,"* but in *Camerarius'* edition of the *Kreuterbuch* (*Frankfurt am Main*, 1590) *Aloe americana* is described and two illustrations are given. The letterpress is taken from *Cæsalpinius* and *Clusius* almost bodily, but it is expressly noted that the plant had come to North Europe from the West Indian Islands, though the usual identification with the **Metl** of the American Continent is added. One of the figures appears to be copied from *Clusius*, with an addition which will presently be noted. The other shows a flowering **Agave** in a gardener's "tub," which might be almost any of the **Euagave** section. This was sent by a correspondent in Italy to show how the American Aloe "poled" in Tuscany.

The addition to the figure borrowed from *De Lecluse* represents the terminal spine of an **Agave** which can only be that known in English gardens now as **Agave americana**. A flower is figured in the margin of the Florentine drawing, which was probably meant to be of the natural size, but this does not agree with either of the species which we suppose to

have been up to that time introduced into South Europe. *Camerarius* has helped a good deal, we think, to perpetuate the general assumption that the **Agave** which has been long cultivated in N. Europe (**Agave americana** of *Linnaeus*) is the same species as that which has run wild on the Mediterranean littoral.

AGAVE SPREADS IN EUROPE.

Kaspar Bauhin ("*Pinax, etc.*" *Basel, 1671, p. 286*) gives under *Aloe* (*1*) *Vulgaris*, (*2*) *Aloe folio in oblongum aculeum abeunte*, quoting for the second *Aloe americana* of *Clusius* and *Aloe alterum genus* of *Cæsalpinius*. Up to this time authors were contented to distinguish what we now call **Agave** from the true **Aloe**, and when further kinds began to be discriminated the definitions did not aim so much at sorting out the species under either genus, but referred to "*Aloe vulgaris*" as the point of departure, which has led to no little difficulty and misunderstanding.

K. Bauhin quotes a work by Linschoten on the East Indies (which we have not been able to consult) for his second *Aloe*, but it appears from other sources that Linschoten saw or heard of that *Agave* in Africa or the Atlantic Islands.

AGAVE APPEARS IN THE EAST INDIES.

The earliest reference to **Agave** in the East Indies that we have traced occurs in a book which professes to contain notes by a pupil of *Boerhaave* of lectures delivered by that acute student of nature towards the close of the 17th century at Leyden. This indicates that a species of **Agave** was by that time established in the Dutch East Indies where it was planted chiefly as a means of keeping out intruders.*

From this work it seems that *Boerhaave* (who taught a system based in the main on an embryological foundation) placed the genus "*Aloe*" in his class of "*Monocotyledones bracteatæ*" and recognized in all six species, of which No. 3 was the true *Aloe* from the island of Socotra (for which see *Bailey Balfour, Botany of Socotra, Edinburgh, 1883*). Nos. 1 and 2 were also species of **Aloe**. From the virtues attributed to the fifth and sixth kinds they were evidently **Agaves** (or **Furcræas**) and American. Of the fourth it is said—

"*Quarta laudatur pro summo nutrimento in usus humanos, uti incolae testantur circa Mekiam, crescit in ingentem altitudinem folia rigidissima habet. Hae pro muris in propugnaculis inserviunt*

First in the spice islands.

* *Galuano* (v. sup.) makes no allusion to any **Agave** as introduced in his time into the E. Indies.

AGAVE APPEARS IN THE EAST INDIES.

arcendis praedonibus, totum folium spinosum & filamentosum est nostratibus Naeldendraet, succus ex calice est edulis et nutrit ut rapa."

Mekia or Makian is a volcanic island about half a degree north of the Equator in 127° E. Long.,—the most southerly of the Ternate group, the original Moluccas or Spice Islands. In 1605 the Dutch expelled the Portuguese from the Moluccas, and in 1664 the Spaniards who had occupied Tidore surrendered that also. In the meantime the colony on Makian had been destroyed and scattered by a great eruption and earthquake in 1646, but the island was reoccupied after a few years, only to be laid waste again some twenty-five years later. We know that there were two ports on the South Sea coast of New Spain for trade with the Philippines and Moluccas, and that ships were built at one of these expressly for the South Sea navigation; so that plants from Mexico might easily find their way to the East Indian Archipelago in the 17th century, but it is remarkable that *Valentyn* ("*Amboyna*," *Dordrecht, 1726*) makes no allusion to the **Agave** though he includes in his List of native and cultivated Trees and Plants the *Lidah Boaya* (*i.e.* Alligator's Tongue) or true **Aloe.**

Rumpf.

Rumpf (*Herb. Amb. V. pp. 271—274, tab. XCIV*) gives a full account of *Lidah Boaya* as "*Sempervivum majus indicum*" which he introduced into *Amboyna* in 1661, and notes that it differs from the *Aloe americana* of *Clusius* 'that being more akin to *Pandanus*'. "*Sempervivum*," it may be noted, was a name applied, it is said, to the true **Aloe** by the traders of Antwerp, who often kept a plant hanging from their roofs as a curiosity.

Burmann—the editor of the *Herb. Amb.*—adds a later note by *Rumphius* dealing very fully with another succulent plant that was first brought to his notice in a deserted plantation (near Amboyna apparently) in 1697, but was spreading in the Colony. The natives called it *Nanas utan*, *i.e.* 'woodland (or wild) pineapple,' or *Nana boaya* (Bwaya = crocodile in the Malay lingua franca, *v. Crawfurd,* etc.) and said that it had been introduced from Macassar.—*Rumpf* compares his plant, of which the figure as regards the general habit is excellent, with the *Aloe americana* of *Clusius* which he knew only by description, noting at the same time that there are discrepancies between his living plant and the description which may be due to climate or casual variation.

The note concludes by remarking that the plant seems to multiply by proliferous gemmation (*i.e.*, from what he calls the second sort of flowers or false blossoms) or by suckers or in either manner, but his observations could not be completed, for which he gives reasons.

AGAVE APPEARS IN THE EAST INDIES.

Rumpf's plant we consider is an **Agave** that is established as a denizen in India, and is markedly distinct from the species naturalized in S. Europe, as well as from the true **Agave americana** of *Linnaeus*, namely **(E)** of our Descriptive List—**A. Cantala**, Roxb.

~~This plant not the same as those then in Europe.~~

We must now return to the "American Aloe" in Europe. *Hermann*, Professor of Medicine and Botany at Leyden, in his Catalogue of the Botanic Garden there (1687) enumerates five species of *Aloe* of which three are true Aloes, one is the "*Aloe folio in oblongum aculeum abeunte*" of *K. Bauhin's Pinax*, while the fourth from the figure (at p. 17) is an Euagave which he describes and calls *Aloe americana sobolifera*. It was brought from America and flowered in a private garden at Harlem shortly before the compilation of the Catalogue.

KNOWLEDGE IN RAY'S TIME.

In the *Historia Plantarum* (*Lond. typ. Maria Clark, 1688, pp. 1195—1201*) *Ray* describes four species of the true *Aloe*. He then deals with *Aloe americana* and distinguishes,

Ray's enumeration.

(1) *Aloe americana*, Clusius
(2) *Aloe americana minor*, Munting
(3) *Aloe serrata major umbellifera*, Munting
(4) *Aloe purpurea laevis*, Munting
(5) *Aloe brasiliensis* (=*caraguata*) Markgraf.

Three species of *Caraguata* (all of Markgraf*) follow, and the chapter concludes with

(6) *Aloe ferox*, Munting

Ray's succeeding chapter discusses certain species described by *Hernandez* (v. supra) under Mexican names which *Ray* considered (though not without doubt in some instances apparently) to be referable to the group (so to speak) of *Aloe americana*. Two of these had been included in the previous chapter (VII).

Before discussing the identity of *Ray's* species it will be convenient to refer to certain other authors, mostly his contemporaries. *Plukenet* (London, 1696)

* We have not made extracts from the works of *Piso* and *Markgraf* (*ed. De Laet, Amsterdam ap. Elzevir. 1658*) because all that is important in their writings can be traced in works ordinarily more accessible.

AGAVES DISTINGUISHED IN RAY'S TIME.

has enumerated (besides *Aloe palustris anglicana* which is = *Stratiotes aloides* Linn.) twenty-two *Aloes*. Out of these there are eight belonging to genera other than Agave or Furcræa which are chiefly true Aloe and received mostly from Africa.

By Plukenet.

His first species "*Aloe perrara Andalusiae*" was obtained from the South of Spain and does not appear to have been taken up subsequently. The remainder seem to be species (or at least forms) of Agave and Furcræa: of *Ray's* species he appears to include the following,—

(1) *folio in oblongum aculeum abeunte*
(2) *Theometel*
(3) *serrata major umbellifera* (Munting)
(4) *purpurea laevis* (Munting)

also the *Caraguata guaçu* of *Ray*, for which however he quotes *Piso* and calls the plant *Aloe americana spinifera*, ignoring seemingly the *Caraguata* and the *Caraguata açanga* of *Markgraf*, which *Ray* had distinguished. He has evidently merged *Ray's* No. iii *serrata umbellifera* of *Munting* in his *americana sobolifera* for which he quotes *Hermann* (v. sup.).

He throws some doubt on *Ray's* identification of *Hernandez'* "*Metl lenissimum*" on grounds which hardly seem forcible. A variegated kind of *Aloe americana* is mentioned which was evidently regarded as a form of "*sobolifera.*" "*Aloe americana radice tuberosa fœtida major,*" = *Pit* or *Pita* of *Parkinson,*—is quoted as being the "*Piet* of the natives" [*i.e.* of the West Indies] and a picture is given in the *Phytographia*. Two varieties are mentioned, one with marginal spines, the other spineless, of which the latter is perhaps a *Furcræa* (*F. gigantea* Vent. ex. *Martius Fl. Brasil, III. p. I. 187.*)

Parkinson's "*Aloe americana foliis cæsiis latioribus*" is doubtfully identified with the "*Aloe americana ex Vera Cruce foliis latioribus glaucis*" of the *Hortus Beaumontianus*. We have not been able, unfortunately, to see figures of either, but the brief descriptions pretty surely refer to one or other of the glaucous Euagaves that are now diffused in Europe.

By Tournefort.

In the "*Institutions*" (Lyons ed. 1706) *Tournefort* has a figure which contrasts the flower of Agave, with that of the true Aloes, but he got no further, and his list of species does not differ materially from that of *Plukenet* except that it is briefer.

By Sloane.

In 1696 *Sir Hans Sloane*, a Fellow of the Royal Society, and afterwards its President, published his *Catalogus Plantarum* as the result of travel, chiefly in the West India Islands. The plants enumerated are those of Jamaica principally, but the book contains many valuable references as regards the Caribean region generally.

The *Catalogue* gives only four "*Aloes*," viz.—

(*a*) *Aloe Dioscoridis*
(*b*) *Aloe secunda seu folio in oblongum aculeum abeunte*
(*c*) *Aloe Yuccae foliis*
(*d*) *Aloe visci in modum arboribus innascens*

(*a*) is a true *Aloe*, and (*d*) a *Tillandsia* or allied *Bromeliaceæ*.

AGAVES DISTINGUISHED ABOUT RAY'S TIME.

(*b*) should be *Agave americana* of *Linnaeus*, because *Kaspar Bauhin*, *Clusius* and *Cæsalpinius* are cited for the species, but its identity with the Mexican "**Metl**" or "**Manguei**" is questioned, very full references being given to the Spanish and English authors, who had dealt with the "**Metl.**"

The local name of the Jamaican plant is given as "**Caraca**," and it is said to be frequent on the stonier and drier hills of that island.

Jamaican Caraca or Keratto ~~loose term~~

Several accounts of "**Caraguata**" are referred to also, and we may say at once that "**Caraguata**" or "**Keratto**" is a comprehensive name locally applied in different countries to different **Agaveæ**, though usually, perhaps, to certain species of **Furcræa**: but in S. America to sundry **Bromeliaceae** also.

(*c*) is identified by *Sloane* with the **Henequen** of older travellers, and he suggests that it may be one of the "*deux dernieres pites qui n'a des petits picquans aux feuilles comme l'ananas*" menticned by *Du Tertre*, as well as the "**Pati** *seu* **Metl lenissimum**" of *Hernandez*. Of this he says "*ad margines viarum Insulæ Jamaicæ locis campestribus et sylvosis crescentem observavi.*" *Martius* (l.c.) observes that the name "**Henequen**" belongs to the ancient language of Haiti, and was applied in the Antilles indiscriminately to different species of **Furcræa** and **Agave**, the corresponding Carib term being "**Pita.**" There are other grounds for thinking that the **Sisal Agave** had been already naturalized in the West Indies before its recent re-introduction, and on the whole it seems likely that the **Pati** of *Hernandez* and *Sloane's* **Henequen** represent **Agave sisalana**, *Perrine*.

By the Commelins of Agave

Towards the end of the same 17th century the *Commelins*,—*Jan* and *Kaspar* (uncle and nephew)—were successively in charge of the Amsterdam Garden, and published tracts on different species of **Agave**, the most important for the present purpose being the younger *Commelin's* Excursus in the *Præludia* (*Leyden, 1703*) on a species which he describes and figures as *Aloe americana polygona*, and identifies with *Munting's Aloe americana minor* which is Ray's No. II.

Commelin, relying, as we suspect, on *Ray*, or perhaps *Munting*, who were in their turn influenced no doubt by the drawing in *Hernandez*, says that his plant is the *Theometel* of

AGAVES of RAY REVIEWED.

the Spanish author. *Mr. Baker* (*Gard. Chron. 1877, vol. VII, p. 200*) keeps up an **Agave Theometel,** *Zuccagni.* *Zuccagni* identified his species with the *Theometel* of *Hernandez,* but *Mr. Baker* remarks that it may be a mere variety of **A. americana** *Linn.*

Ray's first Euagave is A. americana.

Returning now to the *Historia Plantarum*, *Ray's* first **Euagave** is clearly **A americana** *Linn.,* and his second we may take as=**A. Theometel** of *Zuccagni.* In his account of the uses of the first he has not escaped the general confusion, and attributes qualities to the **A. americana** of N. Europe gardens which it cannot claim, but the species that he meant to indicate was that which *Linnaeus* afterwards named "*americana,*" although *Clusius* is cited.

His second apparently is A. Theometel.

His third is no Agave.

The third kind of this group rests on a description which seems to be quoted from *Hermann* but is not to be found in the *Paradisus* or the *Catalogue.* This description answers to the woodcut of the "**Maguey**" in *Hernandez,* which as already said cannot be an **Agave.**

Boerhaave (*Catalogue of Plants in the Leyden Garden* 1720) does not refer to it, and from the flowers it cannot be *Hermann's* "*sobolifera*" with which *Plukenet* and others have identified it.

His fourth is apparently A. Sisalana.

There remains the *Aloe purpurea laevis* of *Munting* of presumed Agaves. As already said we think this must have been **Agave sisalana** *Perrine,* though the purple tint ascribed to the edges of the leaves would fit **Sansevieria** better; as it happens, however, the leaves of the bulbils in **A. sisalana** as well as the species **H** of our descriptive list are spotted with violet-purple, which we have not observed in any other **Euagave.**

His first Caraguata, and second seem Agaves of section Littaea.

The *first Caraguata* (*aloe brasiliensis*) seems to be an **Agave** of the *Littaea* group; and the second may belong there also.

His third probably a Furcraea.

The third (*caraguataguaçu*) has been usually supposed to be a **Furcræa** and is probably = **Furcræa tuberosa,** *Aiton.*

His fourth a Bromeliad.

The *Caraguata açanga* manifestly belongs to the **Bromeliaceae** and is doubtless, as observed by *Ray* himself, the *Mexocotl* of *Hernandez.*

AGAVES OF LINNAEUS.

In the *Hortus Cliffortianus*, 1737, *Linné* describes certain species of *Aloe* (out of which, as before, we exclude all but those belonging to the tribe or natural order of **Agaveæ**) as follows:—

AGAVES OF LINNÆUS.

1. *Aloe foliis lanceolatis dentatis spina cartilaginea terminatis radicalibus* [Synonyms] *A. folio in oblongum aculeum abeunte* Bauh. Pinax [Morison's tab. 22, f. 2 and 3 are also cited; of these fig. 2 is that of *Clusius* without the addition made by *Camerarius*] *Aloe secunda, etc.*, Sloane; *Aloe americana muricata* Bauh. Hist., [and] Boerhaave, *Aloe americana* Besl. Eyst., *Aloe alterum genus ex India occidentale* Caesalp. Syst. 418. *Caraguata guaçu* Markgr. Bras. 87. [A variety is given as *Aloe americana ex vera cruce foliis latioribus et glaucis* Comm. hort. 2 p. 31. t. 16.;—and the native country is said to be "*in sterilioribus aridioribus et saxosis collibus americae jamaicae, etc.*"]

* * * * *

13. *Aloe foliis lanceolatis integerrimis patentiusculis aculeis terminatis radice caulescente* [Synonyms] *Aloe americana viridi rigidissimo et fœtido folio Piet dicto indigenis*, Kiggelaar, in Comm. hort. 2. p. 35 t. 18; Boerhaave Lugdb. 2 p. 129. n. 10; *Aloe americana tuberosa fœtida major Pit Pita* Herm. Prod. 306; *Aloe americana radice tuberosa minor* Pluk. Alm. 19 t. 258 f. 2. [Native country] *Curaçao.*

[A variety is described as *Aloe americana foliis angustioribus ex Vera Cruce. Hort. Carol. 4.*]

The figure cited under 13 from the Phytographia * is referred in the Almagestum (p. 19 as cited by Linnæus) to "*Aloe americana radice tuberosa fœtida major Pit Pita P. B. P. * * * Eadem minor non spinosa*" which *Plukenet* identifies with *Aloe americana viridi rigidissimo et fœtido folio Piet dicto indigenis* of the Hort. Beaumont, but these identifications cannot be relied on, and all that can be said is that *Linnaeus'* Harlem plant was pretty certainly a spineless *Furcræa.*

The two confused plants of Europe.

With respect to 1, it is a fair inference that *Linné* looked on the two distinct plants that are often included under *Agave americana* on the continent of Europe as forms of one species.

We have not been able to inspect ** the figure published by the elder *Commelin*, but there is every likelihood that the glaucous variety of Clifford's collection was the type known in the Calcutta Garden as *A. lurida* and long supposed to be identical with the *Agave lurida* of *Aiton's Hortus Kewensis.* This garden possesses plants received from the great collection of *Sir Thomas Hanbury* at *La Mortola* as *Agave lurida*, which appear to us

* What follows applies to the only copy to which we could refer:—the "*Eadem minor non spinosa*" is what we should now call a subspecies, made by *Plukenet* himself.

** Since seen: it is evidently *Agave lurida* H. B. C. = **A. Vera-Cruz**, *Mill.*

AGAVES OF LINNAEUS.

The two ~~confused~~ plants of Europe.

~~One will be here called A. americana L. The other A. lurida. H.B.C.~~

to be identical with the Calcutta *lurida*:—and this is the species which we understand to be naturalized in South-Eastern Europe and North Africa; though in Spain, and possibly in Algeria (where a second **Agave** is distinguished by the French Botanists as "*A. mexicana*)" other species may have run wild.

*Brotero** (*Fl. Lusitanica*, p. I. p. 539) says "*In Algarbiis nunc ad sepes aliam Agaves speciem colere inceperunt foliis saturate viridibus minus crassis florentem non vidi an A. vivipara L.? an mexicana Lam.?*"

Without careful examination on the spot it is impossible to clear up these points, but there seems small likelihood that the **Agave americana** of the "*Species Plantarum*" has run wild anywhere in Europe or Asia. The "*lurida*" of La Mortola is usually called in Gardens of the South of Europe "*A. americana*" or "*A. mexicana.*"

To distinguish the plant (allied to the true **americana**), which is naturalized in India and (as we believe) in S. France, in parts of Italy,—on the Dalmatic shore,—in the Mediterranean Islands and in N. Africa,—this will be referred to for the present as "*A lurida H. B. C.*", to distinguish it from the true (cultivated) **A. americana** *Linn.*, and the different garden varieties of the latter.

At the time *Linné* compiled the *Hortus Cliffortianus* he had seen only a few specimens of **Agaveæ** in gardens, for he writes:—

"*Flores dum explicat spectatores tanquam ad portentum allicit, at absoluto brevi gaudio perit planta radicibus.*"

Closer opportunities have taught later observers that it is only the one shoot which flowers that is exhausted, and that in a vigorous example several shoots may come to maturity and flower in succession. Conversely, under certain conditions, several branches from the main stem may "pole" simultaneously (*Bull. Soc. Bot. de France* III. *Rev. Bibl. p. 205; also* VI. *p. 181*).

~~One of several shoots may flower and die~~

6/

Agave† was first distinguished in the *Hortis Upsaliensis* (*Stockholm, 1748. p. 87*), but the genus dates technically from

* It should be noted that *Brotero* does not seem to have been aware that the mode of flowering in **Agave** is very different from that which prevails in **Aloe**.

† *Linnaeus* states that he selected the name (v. Hort. Upsal. l.c.) thus "*Africanae et Asiaticae*" [viz., Aloes species] "*utpote officinales, diutius notae*

AGAVES OF LINNAEUS.

the sixth edition of the "*Genera Plantarum*" (*Stockholm, 1764, No. 431 p. 171*). In the *Species Plantarum Ed. 1. Vol. I. p. 323* (*Stockholm, 1753*) there are four species of **Agave** named and described on the Linnæan system, viz.:—

1. *A. americana*
2. *A. vivipara*
3. *A. virginica*
4. *A. fœtida*

No. 3 may be dismissed at once. It has never been known in India out of a Botanic Garden,—it yields no fibre, and belongs to a group so different in vital respects from the **Euagaves** that it has been more than once proposed to separate the group to which **A. virginica** belongs as an independent genus.

A. fœtida is No. 13 of the *Hortus Cliffortianus* and is currently identified with **Furcræa gigantea**, *Vent.* How far this is a correct identification may be left for the present.

No. 1 *A. americana* does not call for any long discussion either. The plant which *Linné* had seen, and knew—founding his genus **Agave** on it,—was undoubtedly the **Agave americana** L. of *Andrews' Repository* (*London, 1799—1811, Vol. 7, 433* †) and of the *Botanical Magazine*, No. *3654* (*Vol. XII. N.S. London, 1839*), so far as the pictures and the technical descriptions are concerned.

The Jamaican habitat given in the *Hortus Cliffortianus* is omitted, and the *Vera Cruz* variety which found a place there also.

It is said of **A. americana** "*Ex ea hodie sepes in Lusitania*," and it is probably in consequenee of this remark that the species which is largely naturalized in S. Europe is often, if not usually, called *A. americana* on the continent.

The second species, *Agave vivipara*, clearly was not known in a living state to *Linnaeus*. The description is "*Foliis dentatis staminibus corollam æquantibus*," which was taken probably from the plate in *Commelin's* Praeludia, already quoted, of "*Aloe americana polygona*" cited by *Linnaeus* as

retineant nomen officinale et usitatissimum; aliud his" [viz., Agavæ speciebus] "*imponatur, inter synonyma nullum dignum occurit, licet antiquo generi antiquum nomen competeret, ideoque dixi Agave quasi plantam admirabilem.*" It is usually stated that the name is derived from a Greek adjective meaning "wonderful," but Linnæus probably did not forget the Amazon or the other mythological personages of whose existence we are reminded by *Danielli* (l.c. p. 69 annot. 2).

† On the plate by an error CCCCXXXVIII.

AGAVES OF LINNAEUS.

a synonym for his *vivipara*. In the text of *Commelin* nothing is said of the stamens being equal to the corolla; and it is expressly stated that the *Aloe americana sobolifera* of *Hermann*, which *Linnaeus* excludes altogether but compares with his *vivipara*, is a totally different plant from the *polygona*.

Commelin is positive that his *polygona* is the *Aloe americana minor* of *Munting* and his engraving corresponds with *Ray's* description (based on the *Aloidarium* presumably), but the further identification with the *Theometel* of *Hernandez* rests on the statement of a ship's captain who had brought the plant to Europe as a febrifuge with the native name *Theometel*, which *Hernandez* had rendered as "*Maguey divinum.*"

Aloe americana minor, however, from the description would seem to differ from the plant which is figured by *Wight* (*Icones*, *2024*) as naturalized in India and referred to the Linnæan "*vivipara.*" *Wight's* species, which is at once recognizable from other **Euagaves**, has a strong likeness to a rough sketch in *Hernandez*, but this is not his *Theometel*.

In the 2nd ed. of the Species Plantarum, *Linnaeus* added as a further synomym for his "*vivipara*" *Aloe americana*, *Rumph. 5. p. 273 t. 94.* *Rumpf* did not intend apparently to identify his plant with that of *De Lecluse*, but in any case it is certain that they are perfectly distinct whether what *De Lecluse* saw was **A. americana** of *Linnaeus* or another species. If *De Lecluse's* drawing was taken from an offset, as is stated, it was probably = *A. lurida H. B. C.*, but it is difficult to separate young plants of this from true **americana**.

Following the later editions of the *Species Plantarum*, the real plant of *Rumpf* has been often called *Agave vivipara*, especially in the East Indies.

In the *Hortus Elthamensis* (*Amsterdam, 1774*) *Dillwyn* figures a plant in *Sherard's* garden (in England) which is styled on the plate "*Aloe barbadensis mitior laete virens et splendens*"; in a List in which the plants are harmonized with the *Species Plantarum* this is reduced to *Agave americana* of Linnæus.

If the identification be correct and the specimen came from Barbadoes this would shew that the true "**americana**" was then in the West Indian Islands, but the drawing is indifferent.

In the fourth volume of the *Collectanea* (*Vienna, 1790, p. 94. t. 1*) *Jacquin* figured and described his *Agave lurida*, which he identified with a species published under that name in the *Hortus Kewensis* of *Aiton* (*1st ed., London, 1789*), at the same time stating that it was well known in Botanic Gardens as the

JACQUIN'S A. LURIDA.

Aloe ex Vera Cruz, but had flowered for the first time at Schönbrunn, where it had been received in 1753 from Holland. JACQUIN'S A. LURIDA.

The description does not quite fit any **Euagave** with which the writers are acquainted; the coloured figure shews a plant* which, whatever it may be, is not **A. americana**, *Linn.*, nor *A. lurida* of the *Calcutta* Garden. It may be presumed that the *Vera Cruz Aloe* of gardens was either identical with the *Aloe ex vera cruce*(1) of the *Hortus Cliffortianus* or was so far like it that the two were identified. *Aiton* (*in the 2nd edition*) does not say that his *Agave lurida* was the *Vera Cruz Aloe* of *Miller*, but he quotes *Willdenow* who took his *A. lurida* from *Aiton's* 1st edition and *Willdenow* gives two varieties, of which *foliis latioribus* is expressly said to be the **Agave Vera Cruz** of *Miller*. *Willdenow* arranged his **Agaves** under two groups—*Acaules* and *Caulescentes*,—*lurida* being in the latter. ~~Willdenow thought this conspecific with A. Vera Cruz.~~

Turning now to *Miller* (*Gardener's Dictionary, VIII ed.*) who, though he made full use of the Linnæan genera, adhered in the main to *Ray* and *Tournefort*, we find three **Agaves** of the Species Plantarum, viz :— MILLER'S ~~EIGHT~~ AGAVES.

1. *A. americana* 2. *A. fœtida* 3. *A. vivipara*

He had No. 3 in cultivation and describes it as *foliis reflexis marginibus dentatis*, and identifies it with the *Aloe sobolifera* of *Hermann* without hesitation, though *Linnaeus* was doubtful and *Commelin* says flatly that they have nothing in common. *Willdenow* had concurred with *Commelin*, at the same time questioning *Linnaeus'* citation of *Rumphius*. ~~His vivipara is not Wight's Indian vivipara.~~

We may say at once that the *Agave vivipara* of *Miller* must be utterly distinct from the plant of *Wight's Icones*.

Miller's second species is *Agave* (*virginia*)† which is altogether different from *Linnaeus' A. virginica*.

The following plants not known to *Linnaeus* are common to *Miller* and *Aiton*—

Gard. Dict.		*Hort. Kewensis (2nd ed.)*
(1) *Agave tuberosa*	=	*Furcræa tuberosa.*
(2) *A. Karatto*	=	*A. americana* β *foliis margine fuscis.*
(3) *A. rigida*	=	*A. lurida* β *foliis angustioribus.*

* The capsule and seeds are those of **A. Wightii** *nobis*, which would seem (from *Schiede*), to occur near *Vera Cruz* in plenty.

† Not, as sometimes quoted, "*virginica*" following a mistake by **Martyn** in Vol. I. Pt. I. of the "*Gardener's and Botanists Dictionary*," London 1807.

MARTYN ON AGAVE

With *Agave* (*virginia*) this makes seven species. *Miller's* eighth and last is *Agave* (*Vera Cruz*) which from his description is *Agave lurida H. B. C.*, or a very closely allied species.

Sherard's plant at Cambridge.

In the tenth Edition of the Gardener's Dictionary (*edited by Thomas Martyn, London, 1807*) in which there are numerous alterations, there are a few notes of interest for our present purpose, *e.g.*, that there was a large variegated **Agave** in the Cambridge Botanic Garden, which had come from *Sherard's* Eltham Garden, that had reached the age of 60 years without flowering. This was no doubt a true **Agave americana**, *Linn.* Again Mr. Cowell flowered an **Agave** in 1729 at Hoxton about which there was controversy, the owner maintaining that specimens flowered in England previously were not the "true great American Aloe," which suggests that there* was at least one other species of the **Agave—Furcraea** group then in cultivation. The third note is worth extracting,

Possibly two Agaves were then in England.

Hedges in S. Europe.

"*There are now hedges of the common Agave in Spain, Portugal, Sicily, and Calabria; it flourishes also about Naples, between Villafranca and Monaco and in other parts of Italy.*" But the common **Agave** of the Mediterranean is the *lurida* of the Calcutta Garden.

WHAT IS W. INDIAN SO-CALLED A. AMERICANA.

We have seen that *Linnaeus*, for the sake of brevity perhaps, omitted the Jamaica habitat for his **Agave americana** from the Species Plantarum, while *Sir Hans Sloane* has given what should be the same plant as a native of stony barren hills in that island, stating that the local name is *Curaca*.

Browne.

Dr. Patrick Browne in his "*History of Jamaica*" (*London, 1789*) states that an **Agave** is indigenous and common in Jamaica, the name is *Corato* or *Curaça*. He gives several synonyms, of which one is the Linnæan description of "*A. vivipara*," with the specific designation omitted, but no weight can be attached to these citations because *Bauhin's* species, which is the **A. americana** of *Linnaeus*, is included, to say nothing of the *Aloe sobolifera* of *Hermann*. *Grisebach* (*Flora of Br. W. Indian Islands, London, 1864, p. 582*) quotes *Browne* for the occurrence of **Agave americana** *Linn.* in Jamaica. He also notes that he has seen specimens from Antigua and (naturalized) from S. Europe, and the E. Indies. As it happens, **Agave americana** *Linn.*, is *not* naturalized anywhere in the

* In the "*Figures of Plants*" (*London, 1760, Vol. II. p. 148, Plate CCXXII*) which were designed to illustrate the earlier editions of the "Dictionary," *Miller* has given an **Agave** that flowered at the Chelsea Garden during 1757. *Martyn* says this was a mere variety of *A. americana* which does not seem likely, but we have not been able so far to refer it clearly to any of the species described by *Miller* himself or by any other author. This illustration is the only one cited by *Ruiz and Pavon* for the Peruvian plant which they have identified with *A. americana, Linn.*, but they admit that there were certain discrepancies.

East Indies: *Grisebach* no doubt had seen Herbarium specimens labelled "*A. americana*," but belonging to another species. He observes that no other **Agave** occurs in West Indian collections, but refers to the *A. Antillarum* of *Descourtilz* comparing it with **A. sobolifera** of *Salm-Dyck*, which that author understood to have come from Haiti and Jamaica.

W. INDIAN ~~SO CALLED~~ A. AMERICANA.

A. sobolifera of *Hermann* seems to be a well-marked species; it is figured* by *Lamarck* (*Encyc. Methodique, Pl. 235, fig. 1*) as *A. vivipara, L.*; '*A. americana, Rumph.*,' is quoted as a synonym, and *Commelin* (*Praeludia*) is also cited. *Lamarck's* plant is said to occur in San Domingo (*i. e.* Haiti) and Jamaica. It seems likely that the account of *Browne* relates, in part at least, to a **Furcræa**, and that this led authors to refer to the *Agave vivipara* of the Species Plantarum, which had stamens not exceeding the corolla. On the other hand both *Browne* and *Descourtilz* lay stress on the conspicuous yellow colour of the blossoms, and it is quite possible that two or more species of **Euagave** are diffused in the West Indian Islands, one being *Hermann's* "*sobolifera*," which seems to be very little known, if known at all, in England.

~~It may be confused with a second species.~~

Lamarck is quoted for another book species which hardly admits of practical identification, viz., *Agave mexicana* (~~*Dict. I. p. 52 and Encycl. Meth. I. 241*~~). In either work the plant is said to be the **Maguey** of the Mexicans. *Furcraea odorata, Persoon*, and *Agave cubensis, Jacq.*, are given as synonyms which are = **Furcræa cubensis**, *Vent.* The *Encyc. Meth.* gives no description, and that in the ~~*Dict.*~~ plainly indicates **Furcræa**, so that *Agave mexicana* falls to the ground as a species. His *Agave americana* is evidently = *A. lurida H. B. C.*, as he says it was naturalized in S. Europe, and he had seen living specimens.

Encycl.

Lamarck's ~~A. mexicana is no species.~~

Suppl.

~~His A. americana is the A. lurida of India.~~

In *Roemer's Collectanea* (*Zurich, 1809, p. 138, Tab. X.*) *Zuccagni* figured and described an **Agave**, which he identified with the *Theometel* of *Hernandez*. The description might be meant for the species figured by *Wight* in the Icones, but we hardly think, after full consideration, that they can be identical. *Roemer's* main engraving is not very good and follows possibly that

ZUCCAGNI'S A. THEOMETEL.

III.

* The figure appears to be taken from Herman[illegible].

n/

DESFONTAINE'S AGAVES.

of *Commelin's "Aloe polygona"* (which is not cited, however), but the enlarged drawings of the flower do not match the Indian "*vivipara.*" It is not stated whence this **Agave** was brought to the Florence Botanic Garden, where it flowered, and was described in 1806 by ***Zuccagni.***

The List of **Agaves** in the *Jardin Du Roi* published at Paris by *Desfontaines* (1815) is as follows:—

* (1) *americana, L.—variegata*
(2) *lurida, Jacq. Coll.*
mexicana
angustifolia
(3) *vivipara, L.*
(4) *fœtida, L.*
(5) *Manguai*
bulbifera, Bonpland
(6) *yuccæfolia, Red. Lil.*
(7) *spicata, Dec. Cat.*

Nos. 6 and 7 are well known species of a different group from the **Euagaves**, with which alone we are so far concerned in India. No. (4) is a **Furcræa**; so most probably was No. (3).—No. (1) was evidently true **Agave americana**, *Linn. Desfontaines* must have seen the naturalized **Agave** of S. Europe and N. Africa, and as he doubted the identity of his No. 2 with the *lurida* of *Jacquin* it was very possibly = ***A. lurida, H. B. C.***, i.e., *Aloe americana* of *Clusius.* The suggestion that it was the "*A. mexicana,*" which the bracket implies, supports this.

SUMMARY OF AGAVES KNOWN A CENTURY AGO.

In the beginning of the 19th century, therefore, it appears that the following species of **Euagave** and **Furcræa** were known to science, viz.—

Agave (Euagave)

I. **Agave americana** *Linn.*

Origin unknown, cultivated as an ornament in the gardens of Europe.

II. **Agave Vera-Cruz** *Miller*

Introduced from Mexico; probably the *Aloe americana* of *Clusius*† naturalized in S. Europe and N. Africa (= *A. lurida H. B. C.*).

* The numbering is ours.

† Hb. H. B. C. possesses a specimen from Xeres in S. Spain, collected by E. Bourgeau (No. 468) named *A. americana* by *Cosson*, which is identical with the *A. lurida* of the Calcutta Garden. This No. of E. Bourgeau is quoted by *Nyman* (*Consp. Fl. Europ.*) for **A. americana**, Linn., which he gives as naturalized along the shore and in the islands of the Mediterranean.

The figure (28) of *A. americana* in *Baillon Hist. des Plantes, XII,* 16, is a fair portrait of *A. lurida H. B. C.*, particularly as regards the inflorescence. The enlarged sketch of the flower is decisive.

SUMMARY OF AGAVES KNOWN A CENTURY AGO.

III. Agave Theometel *Zuccagni*,

Native country doubtful, probably the N.-W. of Central America; flowered at Florence, 1806, or earlier;

not = *A vivipara, Linn.*

nor of *Lamarck*

nor of *Schultes Syst. VII. p. 717*

nor of *Kunth Enum. V. p. 823*

nor = *A. vivipara* of *Wight Ic. 2024*

perhaps = *Theometel* of *Hernandez* (*Anton. Recch. VIII. p. 274*)

IV. *Aloe sobolifera* of *Hermann*,

Native country doubtful, perhaps the Antilles and = A. sobolifera *Salm-Dyck* (*Kunth Enum. V. 822*)

V. *A. lurida, Jacquin* (*Collect. l.c.*),

Native country unknown;

not = *A. lurida, Ait.*

nor = *A. lurida, Gawler* (*Bot. Mag.—1522*)

nor = *A. lurida, Baker in Saunders' Refugium* (*V. 307*)

nor = *Aloe americana, Clusius*

nor = *A. lurida H.B.C.*

VI. *A.* (*species*) (sub "*Sempervivum maius*") *Rumph. Herb. Amb.* (*ed. Burmann, p. 273 t. 94*)

Native country unknown, introduced before 17th century to Amboyna; probably = *Naelden-draet* of Dutch settlers in Moluccas mentioned by Boerhaave;—

not = *Aloe americana* of *Clusius*

nor = *A. americana, Linn.*

nor = *A. vivipara, Linn.*

nor = *A. vivipara, Lam.*

nor = *A. vivipara, Wight*

but = *A. Cantala. *Roxb.*

* *Pr. V. Salm-Dyck*, who appears to have suggested that Rumph's plant was a Bromeliacea, had probably never seen A. Cantala *Roxb.*

SUMMARY OF AGAVES KNOWN A CENTURY AGO.

VII. *Aloe Yuccæ foliis* of *Sloane, Cat. p. 118* in part
= *Henequen* of *Oviedo*
= *Pati seu Metl leuissimum* of *Hernandez* (*Ant. Recch. p. 275*)
Native country unknown, cultivated and naturalized in the Caribean region;—perhaps = **A. sisalana**, *Perrine.*

VIII. *Quetzalychitl quem alii Metl Fitae vocant. (Hernandez l.c.)*
Native country unknown, cultivated in Central America. If this was a **Euagave** it is possibly = our **A. Wightii.**

*IX. **A. Keratto** *Miller* (not of *Salm-Dyck*).
Native or naturalized in the island of St. Christopher.

(We have excluded from this list of **Agaves** all forms that we refer to **Furcræa** as also a few the identity of which is at present hopelessly involved and doubtful.)

Furcræa

1. **F. gigantea** *Vent.*
Native country unknown; cult. and naturalized from Central America and the Caribean region to Northern Brazil.

2 **F. Commelynii** *Salm-Dyck*
= *Aloe americana tuberosa minor* of *Comm. Hort. Amst. 2 f. 19 (f. Salm-Dyck)* (*v. Kunth Enum. v. 842*).
Native country doubtful.

3. **F. tuberosa,** *Ait.*
= *Agave tuberosa, Mill.* (*excl. A. Commelynii f. Salm-Dyck*) native or cultivated and naturalized (?) in West Indian Islands.

4. **F. cubensis,** *Vent.*
= *Agave cubensis Jacq.* (also *Willd.*)
= *Agave mexicana, Lam.*
Native country unknown;—naturalized in the Caribean region and introduced in S. America.

It thus appears that with scanty exceptions the original home of these forms of **Agaveæ** is not satisfactorily established,

* *Agave rigida*, Miller is excluded, as its identity is altogether doubtful.

HOMES OF THESE AGAVES.

while at least three kinds (all of **Agave**) that had been described by præ-Linnean authors remain unidentified. The localities mentioned in the old books give no certain clue, because the writers did not distinguish between native species and those naturalized or even between wild and cultivated forms.

Agave americana is believed by *Martius* (*Fl. Brasil. III. P. I. p. 187*) to be a native of high mountains in Mexico, but his authority is not given, and the plant was probably a different one. **Furcræa tuberosa** *Ait.*, is reported by *Seemann* from the slopes of Chiriqui, a volcano on the borders of Panama and Costa Rica. (*Hemsley Biolog. Central Amer.* l.c. *Supp.* p. 273.) A statement by another traveller is quoted for the occurrence of *Agave americana* wild in the same belt on Chiriqui at 4,000—8,000 feet above sea level, but *Mr. Hemsley* thinks that the **Furcræa** may have been mistaken for it. We think there can be little doubt of this, and further that the **Maguey cimarron** (*i.e.* wild maguey) seen by *Schiede* and *Deppe* in the "regio frigida" of Mexico Proper, whatever it may have been, was not true **A. americana** (*Linnaea IV. 581*). The very circumstance that the Mexicans distinguish the mountain sort as wild shows they are well aware that "*die allbekannte A. americana*," as *Dr. Schiede* styles the **Pulque Agave**, is unknown except in cultivation.

LITERATURE ON AGAVE IN INDIA.

The first account we can trace of any **Agave** in India Proper is in a series of papers by *Dr. W. Roxburgh* which exists in two forms; one of these pamphlets was printed officially, the other appears in the XXII. Vol. of the Transactions of the Society of Arts of London 1804 (which voted its thanks to the author), under the title "*Observations on the culture properties and comparative strength of Hemp, Sun, Jute, and other vegetable fibres the growth of India.*"

Roxburgh.

In a comparative statement appended with the "*Observations*" we find '*Agave americana*" given as No. 11 of the staples on which *Roxburgh* had conducted experiments.

In the official correspondence the same plant is described as a new *Agave;* in both it is referred to as found wild in plenty, though where is not stated, and there can be no doubt that the species is that afterwards described in the *Flora Indica* (*Ed. C. B. Clarke p. 296*) as **A. cantula.**

LITERATURE OF AGAVE IN INDIA.

In the *Hortus Bengalensis* (*Serampore, 1814*) three **Agaves** are shown as cultivated in the *Calcutta* (*Sibpur*) Botanic Garden, viz. :—

(1) *A.* Cantala R.* (2) *A. lurida* (3) *A. tuberosa*

Roxburgh. gives origin of three species.

No. (1) is noted as introduced before 1794 from India, and as having a Sanscrit name which would now-a-days be transcribed as "*Kantala*" No. (2) is said to be a native of America, (date of introduction not given). A footnote states that No. (3) had been received from Kew, but that the species was then already in the Garden (from America 1799) under the name of "*Yucca superba.*"

Voigt, takes up wrong names for one.

In the *Hortus Suburbanus Calcuttensis* (*Bishop's College, 1845*) there is no *Agave Cantala*, but a *Fourcroya Cantula* of *Haworth* appears as synonymous with the "*Agave Cantula*" of the *Flora Indica.* The Bengali name is given as "*Bilati Ananas*" and the source, doubtfully, as the Moluccas or S. China. *Graham* (*Cat. Bombay Plants, p. 272*) is cited, also *Rumpf* (*l.c.*) the usual error being admitted as to *Rumpf* having called his plant "*Aloe americana.*"

What *Rumpf* said was that the Amboyna "*Aloe*" was a very different vegetable from the true *Aloe* or "*Sempervivum*" (Lidah Boaya) and was manifestly *akin* to *Clusius' Aloe americana*, the differences being due perhaps to soil and climate.

We have not seen the original** work of *Haworth*, but his transfer of *Roxburgh's* "*Cantula*" to *Furcraea* was pretty surely an error. *Voigt* (*Hort. Suburb l.c.*) further gives "*Fourcroya tuberosa*" (no doubt the "*Yucca superba*)" and two **Agaves**, viz., 1. *lurida Ait.* 2. *Vera Crucis Haw.* He says expressly that his "*lurida*" is that of the *Hortus Bengalensis.* The first edition of *Aiton's Hortus Kewensis* issued in 1789, so that it is possible that *Roxburgh's* "*A. lurida*" was named with reference to that work, but it does not follow that the Calcutta plant and that of Kew (which appears to be extinct) were identical.

He has two others—one A. lurida as above, the other A. Vera Crucis introduced 1886.

As regards the *A. Vera Crucis Haw.* of *Voigt*, there is happily a clear record. A note by *Wallich* in the unpublished records of the Sibpur Herbariun shews that this was introduced

* The name as spelt in the Hortus Bengalensis has priority and the species is therefore **A. Cantala**, Roxb., not *A. Cantula*, as in the Flora Indica.

** Since seen: the emendation was gratuitous; Roxburgh's plant is a true Agave.

from the Chelsea Garden by *Lord Auckland* during 1836, and was looked on by *Wallich* as doubtfully distinct from the existing "*lurida*." There can be little question that the plant *Haworth* meant was *Miller's* "*Vera Cruz*" *Agave*, and this presumbly is the *Vera Cruz* variety of the *Hortus Cliffortianus* also; that it is the present "*lurida*" of the Calcutta Garden we consider certain. What the "*lurida*" of *Roxburgh's* day may have been remains to be seen, if indeed we are to think that it was distinct from the "*Vera Crucis*" of the *Hortus Suburbanus*, but it certainly was not "*Cantala*." *Roxburgh's* "*Cantala*" seems to have been lost between 1840 and 1847, at which period extensive alterations were in progress. There is a Catalogue of 1847 (which is however probably not exhaustive), in which no **Furcræas** are shewn, and only two **Agaves**, viz., *A. americana Linn.* and *Vera Crucis Haworth.* The "*americana*," if it was the true *americana* of *Linnaeus*, must have been a recent introduction, because this is included in *Voigt's* list of garden desiderata.

LITERATURE ~~ON~~ AGAVE IN INDIA.

~~Was Roxburgh's lurida different from Vera-Cruz?~~

The next after *Roxburgh* to observe an **Agave** naturalized in India was *Dr. Francis Buchanan* (afterwards *Hamilton*).

The following is from the "*Journey*" (*London 1807, p. 36*) [march of 6th May 1800, Baydamangulum to Tayculum.]

"*The natives here plant also many aloes* (*Agave vivipara*) *in their hedges and use the leaves for making cordage. It forms a strong defence against both man and beast, and thrives better in the arid soil of Mysore than in any other place that I have seen;—its Canarese or Karnataca name is Ravana Meshid.*"

Buchanan Hamilton, ~~found planting of an Agave going on in Mysore.~~

There is nothing to shew why *Buchanan* named his plant (which is pretty certainly the same as *Wight's*) *Agave vivipara*, but most likely he was led by *Linnaeus'* citations in the *Species Plantarum*.

Moon's Catalogue (*Colombo, 1824, p. 25*) gives as growing in Ceylon *Agave americana, A. lurida*, and *Furcræa tuberosa*. No authorities are cited, but as the English name of "*lurida*" is given as "*Vera Cruz*" (Aloe) the species doubtless was = *A. lurida H. B. C.* What Moon's *A. americana* may have been, we cannot say, and the same applies to records from the Mascarene Islands, from the Cape of Good Hope, and Saint Helena also. A St. Helena plant cultivated in the Botanic Garden at Buitenzorg (Java) has been described as a distinct species by *Haworth* under the name of *A. angustifolia*.

Moon, ~~had 3 species in Ceylon~~

~~Naturalisation in Africa.~~

In the Flora Capensis (*Stuttgardt, 1823*) *Thunberg* mentions "*Agave americana*" as naturalized on Table Mountain, etc.

Certain *Agaveæ* have been long naturalized in the Mauritius. *Mr. Baker* (Flora of Mauritius, 1877) shews *Agave americana* and *Furcraea gigantea* as established. A *Furcraea* known as "*Mauritius Hemp*" is grown in parts of Southern India.

LITERATURE ON AGAVE IN INDIA.

Graham found one species at Bombay.

In his *Catalogue of the plants of Bombay and its vicinity, Graham* has the following:—"*1572 A. Cantula Roxb. Flora "Ind. 2 p. 167. Aloe americana Rumph. Hort. Amb. 5. t. 94.* "A *stately Aloe-looking plant, the central scape rising to the height* "*of 15 to 20 ft., flowers in rains; in gardens, Bombay, Seroor.* "*There is a variety with long flexuous leaves. The seeds germinate* "*in the capsules before they drop off, as in A. vivipara.*"

The common **Agave** of to-day in hedges near Bombay and Poona is a plant which we identify with *Rumpf's* figure and with *Roxburgh's* "**Cantala.**" It seems doubtful if there are specimens of this from the New World in European collections, unless it be *Agave laxa* of *Zuccarini* (for which see *Baker* in *Gard. Chronicle Vol. VIII. 1877. p. 780, figure 151.*). *Mr. Baker's* figure is not unlike a form that is common in hedges at Saharanpur (in the Agra Province). This form was referred by the late *Mr. Gollan* to an **Agave** that is identical with specimens recently collected in the Bombay neighbourhood, which we refer to **A. Cantala.**

Species at Saharanpur in 1855.

The Saharanpur Catalogue of 1855 shews the following,—*A. procumbens, A. tuberosa, A. cantula, A. americana, and Littaea geminiflora.* The last named is an **Agave** of a different section from the **Euagaves**, and for our purpose negligible. The "*A. tuberosa*" was probably a **Furcræa** which is still represented in the Garden, though not naturalized anywhere in N. India. "*A. americana*" probably covered **A. americana**, *Linn.* (cultivated in the Garden solely) as well as a quite different species which has run wild in waste places and hedges through the whole Civil Station. On what authority we have not been able to discover, the second species has been called "*A. lurida*" at Saharanpur for some time past. To this Saharanpur "*lurida*" (which is *not=lurida H. B. C.*) the natives give the name of "*Rámbanskeora*" to distinguish it from the ordinary "*Banskeora*" which at Saharanpur is usually applied to Wight's *A. vivipara.*

In *Dr. Jameson's* Catalogue "*Banskeora*" is appropriated to his "*Agave procumbens,*" but this is possibly a slip. If, however, the vernacular name was deliberately restricted to "*A. procumbens,*" then "*A. procumbens*" was most likely meant for Wight's "*vivipara,*" the allusion being to the way the trunk often lies along the banks of ditches and other sites where "*vivipara*" luxuriates, particularly near the old Rohilla fortifications.

If *procumbens* was=*vivipara* (Wight), then *A. cantula* must have been Roxburgh's species.

AGAVES NOW AT SAHARANPUR.

The *Agaves* now existing in a naturalized condition in and about the Saharanpur Garden are as follows,—

(*i*) *A. vivipara* (*Wight*)

(*ii*) *A. Cantala* (*Roxb.*)

(*iii*) *A.* not named; (believed by Mr. Gollan to be merely a form of the preceding) may we think be the same as *Graham's* "flexuous" variety of **A. Cantala.** It seems to have everywhere a poor reputation as a fibre plant, which is not the case with **A. Cantala** proper. This unnamed form has a weedy habit, the outer leaves often bending over almost from their point of origin.

(*iv*) "*A. lurida*" (Saharanpur).

A. Cantala is said to be widely spread in the Dehra Dun, and to extend to the outer* Himalaya, where it is used for hedges, but further enquiry is called for as to this, because it has not been always distinguished from another **Euagave** of which the Calcutta Garden possesses specimens, descended mostly from seed sent by *Mr. J. S. Gamble, F. R. S.*, from the Dehra Dun some years ago under the name of "*A. mexicana.*" Fibre was manufactured in the Dehra Jail formerly from a naturalized **Agave** described in accordance with the ordinary practice as "*Agave americana.*" It is doubtful if fibre has been ever made, save as an experiment, from the true **A. americana** of *Linnaeus*, which does not exist in the Dehra Dun, or anywhere else in India for that matter, so far as we know, in sufficient quantity.

~~DIVIDED OPINIONS.~~ Agave Cantala

The difficulties that confront the student in dealing with the **Agaveæ** are well illustrated by the case of *Roxburgh's* species. *Mr. Baker* (*Gard. Chron. 1877, Vol. VIII. p. 780*) refers *A. Cantula* of *Roxburgh* to *A. vivipara* of *Linnaeus* "*at any rate as regards the synonym Rumph. Amb. Vol. V. p. 273. tab. 94*" and at the same time cites the *A. vivipara* of *Wight* as another synonym. His view has been followed, as the best authority then available, in *Kew Bulletin No. 39, March 1890, CXXXV* **(Bombay Aloe Fibre).** He further identifies *A. Cantula* with *A. Rumphii, Hassk.* (*Cult. Hort. Bogor.*) which purports to be the plant figured in the *Herbarium Amboinense. Rumpf's* plate has often been taken for the plant figured by *Wight*, but on due examination of live specimens the

~~The possibility of A. Cantala being A. Rumphii of Java.~~

* To about 6,000 ft. above sea level in the station of Mussooree.

COMMENTS ON A. CANTALA.

resemblance vanishes. *Hasskarl* published his species in a supplement to "*Flora*" (*II. 1842. p. 5*) as follows:—

"*Agave Rumphii mihi. Acaulis foliis lineari-lanceolatis, canaliculatis acuminatis spinis marginalibus nigris rigidis sursum arcuatis, scapo ramoso demum viviparo, staminibus corollam longe superantibus. Corollæ limbo revoluto. Ch. Sprg. S. V. II. 79— Willd. Sp. Pl. II. 195. Schlt. VII. 127. Rumph. Amb. v. 273. t. 94 Nom. Sund. Nannas sabrang=Bromelia transmarina.*"

Zollinger, wrongly called the Javan plant A. Cantala.

He does not cite **A. Cantula** *Roxb.* as a synonym, and the revolute segments of the perianth of his description do not suit any species as yet observed in India. *Zollinger* (*Syst. Vers. der in Ind. Archipel etc., Zurich, 1854*) sets aside *Hasskarl's* name in favour of *Roxburgh's;* he had at least one specimen before him and had seen the plant of *Hasskarl* living in the Buitenzorg Garden. In the latest Catalogue of that garden (*Teysmann and Binnendijk, Cat. Pl. H. B. Bogor, 1866*) *A. Cantula Roxb.* is maintained and *A. Rumphii, Hasskarl* excluded.

In the Garden of *Sir Thomas Hanbury* at Mentone (*Syst. Cat. by G. Cronemeyer, Erfurt, 1889*) *Agave Rumphii, A. Cantula, A. vivipara,* and *A. Theometel* are all separately represented. *Mr. Watson* of the Kew Garden visited the Riviera during 1889 (*Kew Bulletin No. 36, Dec. 1889, CXXVI*) and his notes on **Agaves** include the following.

"*A. Rumphii Hassk.—Mr. Baker refers this to 'A. vivipara' but the plant under the former name in Mr. Hanbury's Garden looks like a gigantic A. rigida; it is a very fine* **Agave**, *the leaves about 5 feet long and very numerous.*"

* * * * *

"*A. vivipara Linn.* (*A. Cantula*). *A distinct species, more resembling a Furcraea. This lately flowered at Mentone.*"

Baker says A. Cantula of Riviera is form of A. rigida; if so, then Cantula of Riviera is not Cantala of India.

In November 1891 *Mr. Baker* himself visited the Riviera (*Kew Bull. No. 61, January 1892, CCXXIII*).

We extract the following as it is material:—

"*A. rigida Miller. This, the most valuable and most variable of all the Agaves, is common and quite at home in the Riviera Gardens, flowering freely; and I had an opportunity of studying its characters and range of variation far better than I had ever done before and of seeing several forms with which I was not previously acquainted. The commonest forms in the Riviera show the characteristic small distant nearly black teeth, and agree very well with*

what has been described and figured as Ixtli and ixtlioides (*Bot. Mag. t. 5893*). *In Dr. Hern's garden, situated just on the French side of the Boundary Gorge at St. Louis, I saw a form with leaves much thicker than usual* (*1½ inches thick at the base*) *and forming a less dense rosette. The plants called Cantula and Rumphii in the Riviera gardens are forms of rigida. Mr. Hanbury has just flowered a spineless form that agrees very well with the sisalana of Yucatan and Florida. I am quite satisfied now that A. Houllettii, Jacobi, is nothing more than undeveloped sisalana, and the same holds good with a plant called laevis. One panicle of this species at La Mortola was producing copious bulbillæ. The peduncle, including the rhomboid panicle, does not reach a greater height than 12—15 feet. The bract leaves, like those of americana, are small and distinct as compared with those of atrovirens.*"

COMMENTS ON A. CANTULA. A

If this decision be accepted it is certain that the plants named "*Cantula*," and "*Rumphii*" at La Mortola cannot be the plants of *Roxburgh* and *Hasskarl* respectively. We possess in India specimens received from Kew as "*Agave rigida*" which differ absolutely from any species naturalized in the East Indies, and from *Rumphius*' figure also. The reference to the picture and account of *A. ixtlioides* in *Bot. Mag. 5893* complicates the question, for the plant there depicted,—after every allowance for the effects of artificial nurture,—could not pass as conspecific with the **Sisal Hemp** of India. That the Indian **Sisal** is the plant introduced from Yucatan to Florida by *Dr. Perrine*, is certain; see among other authorities *Kew Bulletin No. 62 of 1892, CCXXVII* (**Sisal Hemp**) and *Bulletin No. 5, 1899, Dept. of Land Records and Agriculture, Bengal*, (**Agave sisalana**).

A. sisalana in India varies as regards its leaves from margins absolutely smooth to fairly thorny, but there is one **Sisal Hemp** in this country and one only. Leaves with and without prickles may be found on the same individual.

Royle and Wight had never seen A. Cantala.

To return to **A. Cantala**,—*Royle* had evidently never seen an authentic example of this (1853), nor had *Wight*, who does not even mention *Roxburgh's* species. *Wight* (*Icones VI.* pp. 18-19) says—(under *Agave vivipara*).

"*The Agave americana or as it is usually called American Aloe, now so common all over the country, belongs to the same genus and, as the name imports, comes from the same country. They are not Aloes. Rumphius has introduced a figure of this plant into his*

COMMENTS ON A. CANTALA

Herb. Amboynensis apparently on the supposition of its being indigenous in that island."

It is needless to comment on this passage in detail, but it is essential to observe that the plant with which "*Agave americana*" is being compared is the *Agave vivipera* (*sic*) of Linnaeus, and that it is for introducing a figure of Wight's own *Agave vivipara* that *Rumpf* is (unjustly as it happens) indited. The passage seems to have been often read as if the plant of which *Burmann* added (from *Rumphius*' "*Auctuarium*)" a plate to the original account of "*Sempervivum*," was '*Agave americana*.' Actually it is neither *A.* '*americana*' nor '*A. vivipara*' (of *Wight*) but **A. Cantala** Roxb.

Burmann added plate of A. Cantala to Rumpf's work for A. americana and Wight took it to be his A. vivipara which he thought also to be Linn's.

Wight's illustration is not very good, but it cannot fail to be recognized by any one who is conversant with the Indian **Agaves**, and it should be equally impossible to confound either the species itself or *Wight's* artist's drawing with the plate in *Rumphius*. There is an unpublished drawing in the Herbarium H. B. C. marked as *A. vivipara*, *L.* in Wallich's handwriting under which is written "? *A. Cantula*, *Roxb.*" The species is unmistakably that of *Wight's* figure, the more so that both represent plants which have blossomed, when the appearance of the "rosette" or bunch of leaves (which in "*vivipara*" is highly characteristic) differs conspicuously from the previous condition.

Wight's drawing of his A. vivipara was doubtfully named Cantala by Wallich.

Wallich's query was due probably to the original "**Cantala**" having been lost from the garden; and it must, we think, be answered in the negative.

In the first place, there is a plant which is fairly abundant and self-propagated in some parts of India answering to the figure and description in the *Herb. Amb.* which *Roxburgh* after mature consideration cited for his *Agave Cantula*.

Type of A. Cantala lost but reasons for identifying species.

In the second place, the Calcutta garden name for *Wight's* species is "*A. Cantula* var. *vivipara*," which suggests that the Roxburghian plant was readily distinguishable.

The plant which we identify with **A. Cantala** is proved by specimens to be plentiful about Bombay, and through the kindness of *Mr. I. H. Burkill, F.L.S.*, we have seen undoubted examples of this well-marked species from the Northern Circars, the scene of *Roxburgh's* own chief explorations.

Roughly speaking, **A. Cantala** extends from Central India (both E. and W. Coasts) to the N. W. Gangetic Plain and

Gamble's AGAVE, OF DELHI. ~~Apparently A mexicana, Gamble.~~

the Sub-Siwalik tract as far as the Ravi. In the arid strip between Gwalior and Delhi it seems to be absent, but another **Agave** has found its way into this vacant corner.

From a suite of specimens which the Reporter on Economic Products to the Government of India has placed at our disposal, we think that this other Agave is identical with *Mr. Gamble's A. mexicana.*

BOMBAY AGAVES. Dalzell and Gibson's ~~statement.~~

Dalzell and Gibson (*Bombay Flora, Bombay, 1861*) mention three **Agaveæ** (under **Bromeliaceæ**) as follows:—

1. *Agave Cantula.* Aloe americana, Roxb. Fl. Ind. 2. 167. *A stately Aloe-looking plant, the central scape rising to the height of 15 or 20 feet, flowers in the rains. The broad ensiform leaves give material for rope or twine.*
2. *A. vivipara, is the narrower leaved plant, leaves flexuous and drooping, which may be seen growing in waste places; and is planted in situations where its roots may retain the earth when washed down by the rains. In the Madras Presidency it is employed in this way to keep up the earth near to the parapets of bridges, a practice which might with advantage be followed on our side of India.*
3. *Furcræa fœtida, Vent. in Usteri Ann. 19—54.—A plant similar in habit to Agave Cantula, but having thinner and more flaccid leaves, and green flowers. In gardens, Bombay, rare.*"

~~Graham had said that Bombay vivipara is var. of Cantula.~~

* * * * *

There can be little doubt that the "vivipara" of the Bombay Flora is the form with weak leaves that is common in hedges at Saharanpur.

~~Dalzell and Gibson's Cantula hardly seems right Cantula, but right Cantala is on Bombay side.~~

Graham made it a variety of *A. Cantula*, Roxb. *Dalzell and Gibson* repeat *Graham* for part of their remarks, but the "broad ensiform leaves" which they assign to *A. Cantula* are puzzling. Moreover, they seem to ignore *Wight* altogether. Possibly their *Cantula* is *Wight's vivipara.*

It is curious that *Mr. Watson* speaks of *A. Rumphii*, Hasskarl, as "*a very fine Agave, the leaves about 5 feet long and very numerous*" and as like a gigantic *A. rigida.*" We hardly think that *Wight's vivipara* would be described "as a stately Aloe" or as "a very fine Agave"; unfortunately we have no specimens or picture of the *A. Rumphii* or *A. Cantula* from La Mortola, but without attempting to decide whether *Dalzell and Gibson's A. Cantula* was the same as *Graham's*, we are convinced that what we regard as the true **Cantula** *i.e.* the **A. Cantala** of the *Hort. Bengal*, is a common hedge-plant in the Bombay neighbourhood.

BOMBAY AGAVES.

In the Kew Bulletin No. 39, March 1890 CXXXI (**Bombay Aloe Fibre**) the source of this was taken to be *A. vivipara* as described by *Baker* in the Gardener's Chronicle (l.c.) which he had further identified with *Roxburgh's A. Cantula.*

It is impossible that this "Bombay Aloe" could be *Wight's* plant, because it had leaves 4—5 feet long and rather concave, whereas the leaves of *Wight's vivipara* are conspicuously flat on the upper surface, and the largest leaves observed have not exceeded three feet in length,—the average being two feet and a quarter.

It is clear from the correspondence printed with the Bulletin just quoted that the "**Bombay Aloe Fibre**" then being shipped to England was not grown at Bombay, but obtained (from more than one species most likely) in the Carnatic and Central India. Fibre is now shipped from Bombay that is raised in the immediate neighbourhood, and, so far as our information goes, this is largely taken from **A. Cantala** of *Roxb.* (=*A. vivipara L. according to Baker as above*, not in Gard. Chron.)

Reference to the "*Observations*" quoted above will show that *Roxburgh's* experiments gave a high place among the fibres tested to the **Agave** there mentioned, which we believe to have been the same that he published later as **A. Cantala.**

Further enquiry is very necessary to ascertain whether the weak "flexuous" variety of *Graham* is or is not distinct from **A. Cantala.** Its fibre,—rightly or wrongly,—seems to be generally looked on as worthless.

It may here be noted that in *Drury's Useful Plants of India* (*Madras 1858*) Wight's Icon 2024 is quoted for "*Agave americana*" although "*A vivipara L.*" is given on the next page without comment. Of *A. americana* it is stated:—

"It is much valued as a hedge-plant, but its chief importance arises from the excellent fibres which it yields. Not only are these produced from the leaves, but a ligneous fibre is contained in the root familiarly known as the *Pita* thread. This is much used in the Madras Presidency."

We have not been able to confirm the extraction* of fibre from the root of any **Agave**, and as the passage goes on to describe the process of making thread from the leaves, there is probably a clerical error somewhere.

This "ligneous fibre" reappears in Babu T. N. Mukerji's *Descriptive Catalogue of Indian Produce contributed to the Amsterdam Exhibition*, 1883, but it is there stated to be got from the "stem" (? scape) of "*Agave americana.*"

* *Hernandez* speaks of ropes being made with the roots themselves, which is a different matter.

Nomenclature.

SUMMARY OF REASONS FOR NAMES.

AGAVE WIGHTII.

A new name necessary to distinguish Wight's vivi para from the true vivipara.

We have so far tried to extricate the two species that are most widely spread in India, with the result that for the plant of *Roxburgh* the name given in the Hortus Bengalensis remains unaffected (species **E** of List = **A. Cantala** *Roxb.*).

For *Wight's* "*vivipara*" we conclude that a new name must be proposed, and have shown this in our List as Species **J** = "**A. Wightii**" accordingly.

Reasons have at the same time been adduced for holding that the **Sisal Hemp** (of India) has nothing to do with the plant usually styled *Agave rigida* in gardens.

CALCUTTA A. LURIDA MUST BE CALLED A. VERA-CRUZ.

H.B.C.

We may now take up the species known in the Calcutta Garden as "*A. lurida.*" This is not the "*A. lurida*" of *Jacquin,* nor is it the plant portrayed at No. 1522 of *Sims'* *Bot. Magazine* and described as *A. lurida* of the *Hort. Kewensis* by *Gawler.* The leaves of that, as well as those of the *A. lurida* of *Baker* (*in Saunders' Refugium T. 307*) are on far too small a scale for the Calcutta "*lurida,*" while the habit of the latter is quite different; on the other hand, except that the segments of the perianth open campanulately in the figure, the flower in the *Refugium* is similar.

The earlier figure must be given up, we think; and the description, which was made solely from the figure, goes with it.

Aiton's description might apply to several **Euagaves,** but he doubtless meant to indicate the **Agave Vera-Cruz** of *Miller,* and the only ground on which *Miller's* name could be set aside would be that it is not classical; but at all events it does not pretend to correct latinity as does "*Vera Crucis,*" which is manifestly wrong, or "*Verae Crucis,*" which is questionable. No caveat can apparently be lodged on the score of priority. We therefore venture to restore for this **Agave** *Miller's* name of **Agave Vera-Cruz,** without attempting to pronounce whether **A. atrovirens** of *Karwinski,* and certain other forms that seem very much akin to it are specifically distinct or otherwise. This is **D.** of our Descriptive List = **A. Vera-Cruz** *Miller.*

Closely allied, it would seem, to the preceding is a plant which we have not seen except from the Saharanpur Botanic Garden, where it was received from the continent of Europe

nclature.

SUMMARY OF REASONS FOR NAMES

under the name of *A. Jacquiniana* (reduced in the Index Kewensis to *A. lurida* of *Aiton.*)*

We shall have to refer to this shortly, but the present point is that the Saharanpur plant under discussion most assuredly is not *A. Jacquiniana, Hooker.* It is nearest so far as we can judge to the **A. atrovirens** of *Karwinski* (see *Rose* in *Contrib. U. S. National Herb. v. 223—225*) = *A. Salmiana Otto*, which is one of the chief *Pulque* plants of Mexico: *Humboldt* (quoted by *Sir W. Hooker* in his note on *A. americana* just mentioned) writes "This sturdy, harsh and fleshy-leaved plant is uninjured by the "occasional drought, frosts and excessive cold which prevail on "the lofty cordilleras of Mexico"; and it is possible that the home of the *pseudo-Jacquiniana* is in that climate, and that it is therefore able to survive the winters of N. W. India, to which **A. Vera-Cruz** appears not to be equal, in the same degree at all events.

AGAVE SPECIES C.

We cannot follow the reduction of *A. Jacquiniana, Hooker* to *A lurida*, if by "*A. lurida*" **A. Vera-Cruz** *Miller* be intended, and it is hopeless to compare *A. lurida* of *Aiton*, as the type† has long ago been lost, while the descriptions in the systematic books are mostly fitted to **A. Vera-Cruz**, with the misleading addition of a long caudex (as a compromise perhaps with *A. Jacquiniana, Hooker*).

We have referred to this Saharanpur "*Jacquiniana*," because if aloe fibre cultivation should extend it seems not at all an unlikely sort to be tried in the colder parts of India, though it might turn out to be of more interest to the Excise than to the Agricultural Department. At present there is not material enough even for experiment (in Descriptive List **C**).

AGAVE SPECIES A.

Agave A. of the Descriptive List is in cultivation at Saharanpur, though not as a "fibre aloe." In this the marginal spines are small, fine, ruby-coloured and close-set on a hardly perceptible border of the same tint running all along the leaf

* A. *Jacquiniana* was originally proposed by *Schultes* (*Syst. VII. P. I. p. 727*) for the plant of the *Collectanea* (with regard to *Gawler's* strictures in *Bot. Mag.* 1522) in case *Jacquin's* species should turn out to be distinct from all previously described species. In 1859 an **Agave** that had come from Honduras flowered at Kew,—was identified with *Jacquin's lurida*—and published in the *Bot. Mag.* (5097) as *A. Jacquiniana*; the correct citation therefore is *A. Jacquiniana, Hooker.* This was not impossibly = A vivipara of Wight—**A. Wightii nobis.**

† *Mr. Baker* may be right in identifying the plant he described in the *Refugium* with *Aiton's lurida*, but the segments of the perianth in *Saunders'* figure, and the leaves will not do for **A. Vera Cruz** of *Miller.*

margin. A plant reported to be naturalized in Burma seems to be this, or at least very near to it. Nothing is known of the qualities of either form (if they are distinct), nor can they be properly identified, but they are allied possibly to **Agave Keratto** of *Miller*.

The Saharanpur specimens are named "*Agave Ixtli*," which is certainly inapplicable. The original **A. Ixtli** of *Karwinski* came from Yucatan, and his description (which is quoted in Kunth's Enum., V. p. 835) leads us to think that his plant must be near the very marked species which has been described by *Mr. Baker* in the *Kew Bulletin* (*Nos. 67, 68, July-August 1892, CCLVII*, **False Sisal of Florida**). There has been great confusion as to *A. Ixtli*, as will be perceived on reference to *Bot. Mag. 5893*, where an *Agave ixtly* of *Haworth* is mentioned as distinct from that of *Koch*,* besides *Jacobi's*, which was possibly intended to be the **A. Ixtli** of *Karwinski*.

In the notice just quoted it is suggested that *A. ixtly Jacobi* may belong to the same species with that writer's *A. fourcroydes* and *A. ixtlioides*, of which *5893 Bot. Mag.* is a representation.

In the *Index Kewensis* the "*ixtly*" (*i*) of *Koch* (*ii*) of *Haworth*, and (*iii*) of *Jacobi* are not separately mentioned, while **A. ixtli** of *Karwinski* is reduced, with "*fourcroydes*," "*ixtlioides*," and **A. sisalana**, *Perrine*, to the *A. rigida* of *Miller*.

These identifications rest on the conclusions of *Engelmann* (*Notes on Agave reprinted in Bot. Works, Cambridge, Mass. p. 312, 1887*). His account is too long for quotation as a whole, but an extract will be given under the next species. He identifies an **Agave** that flowered at Antibes in 1872 with **A. Ixtli** (presumably of *Karwinski*), and this again with a wild **Agave** of Yucatan, called by the Indians *Chelem*. Of the '*Chelem*' he says '*which I refer with little doubt to Miller's old A. rigida*.'

He gives no grounds for this last identification, while his description has not much in common with *Karwinski's* of **A. Ixtli**, and differs in material respects from that of *Miller's A. rigida*: other difficulties apart, an insuperable bar presents

* From the notice of *Koch's* Monograph in *Bull. Soc. Bot. de France vii Rev. Bibl. 189 Karwinski's A. Ixtli* only would appear to have been included and is doubtless that intended.

itself in the fact that **A. sisalana** *Perrine* sends up suckers freely and continuously, whereas *Miller* says of his *A. rigida*,—"*This sort never puts out suckers from the root, nor have I seen any plants of this kind in flower, although there are many of them in the English Gardens some of which are of considerable age.*"

As to **A. Ixtli** *Karwinski*, and **A. decipiens** *Baker*, the peculiar apple-green of the rather narrow channelled leaves is a striking mark, as remarked by both authors, whereas *Miller's* plant was glaucous. Moreover *A. rigida* came from the *Vera Cruz* country, while **A. Ixtli** is, like **sisalana**, from the *Yucatan* peninsula, which has a Flora, as *Grisebach* has pointed out, more akin to that of the Caribean region than to that of Central Mexico. *Miller's A. rigida* resembles **sisalana** in one point it is true,—that it was spineless (though this is by no means always so with **sisalana**) but this very character divides it from **A. Ixtli**, which is well armed.

Specimens of what we believe to be *Baker's* **A. decipiens** are growing at Sibpur and Saharanpur,—also with the Agri-Hort. Society at Lahore, from which garden the Calcutta specimen is derived, the Lahore name being "*A. rigida*," and the stock received from Kew originally. The Saharanpur supply came from a Nursery in Florida labelled "*A. rigida, type*," referring doubtless to the work of *Engelmann.* These plants exactly match *Miss Mulford's* illustration (from a photograph) of *A. decipiens* (*Missouri Bot. Garden Report, Vol. 7, 1896, p.* 67), and *Miss G. E. Johnson's* outline drawings (pl. 68-69), also the sketch in *U. S. A. Department of Agriculture Report No. 9 Washington 1897, p. 45, figure 9*, except that the trunk in *Mr. Dodge's* sketch is more conspicuous,—the subject having manifestly been an old and large specimen from which the outer leaves have been cut or dropped away extensively.

"*A. Ixtli*" of *Gartenflora* 1883 (p. 149) may be=*A. ixtlioides* of Bot. Mag. 5893. We cannot think that it is=**A. decipiens** *Baker*, and it is widely removed from **A. sisalana**, *Perrine.* The synonymy is very intricate.

We have discussed this Agave (*A. decipiens Baker*) at some length,—partly because of its supposed resemblance to **A. sisalana**,—a resemblance which we are bound at the same time to say we are unable to discover,—and partly in the hope of

clearing up some of the mist that has fallen upon **A. Ixtli** and on *A. rigida* of *Miller.*

There is little to guide us as to the identity of *Miller's* plant, but there is nothing to shew that it was a **Euagave,**—and it should be looked for perhaps in another section of the Genus. The description (quoted we presume) in Kunth's Enum., V. 830 of *A.* (*Littaea*) *revoluta*, Klotzsch seems not far off it: *Hernandez* "*Metl V. angustifolia*" = *Nequametl* (which is *not* the *Nequametl* of *Markgraf* apparently) should probably find a place in the same neighbourhood.

The last species that demands attention is the **Sisal Agave,** of which, as we have already seen, there is one species and one only in India.

Dr. Engelmann,—after giving a formal description of the plant which he assumed to be the wild type of the "**Sisal**" that is naturalized in Florida,—proceeded to take up certain cultivated forms as follows:—

* * * * *

"**Var. longifolia**: *foliis multo longioribus glaucis, aculeato-dentatis, spina terminali non decurrenti.*

"**Var.? Sisalana**: *foliis multo longioribus viridioribus margine integris seu pauci-dentatis, spina terminali non decurrenti.* **Agave Sisalana,** *Perrine*, vide infra.

"The original* plant was, according to Miller, brought from Vera-Cruz; my specimens, on which the above diagnosis is based, were collected in Yucatan by Dr. Schott. Dr. Perrine forty, and Dr. Schott ten, years ago studied in Yucatan this interesting plant,—its different forms and economical uses, and left us accounts of it, the former in Senate Doc. 300, Washington, Mar. 12. 1838; the latter in the Report of the Agricultural Department at Washington for 1869. Both agree that there is a common native species in Yucatan, called Chelem by the aboriginal inhabitants; but from time immemorial a number of varieties, all characterized by much longer leaves, and one also by the absence of marginal spines, and differing among themselves in the quantity and quality of their

* *i.e., A. rigida* Miller, on Engelmann's theory.

nendature.

~~SUMMARY OF REASONS FOR NAMES.~~

Engelmann's views on sisal.

fibre, have been cultivated by the natives of Yucatan, and are a staple product of that country to this day, furnishing the well known Sisal hemp. The people know them as Jenequen (Schott) or Henequen (Perrine) and distinguish, as [317 (29)] Dr. Schott reports, the Yaxci (Yashki) as furnishing the best quality and the Sacci (Sacqui) with the largest quantity of fibre; Chucumci, larger than the last, produces coarser fibre; Babci has fine fibre, but in smaller quantity; Citamci, with small narrow leaves and poor fibre, stands probably nearest to the wild plant. Dr. Perrine mentions another variety, Istle, evidently the Ixtli of Karwinski, as furnishing a fine fibre called Pita. These plants yield a return of leaves when four or five years old, and may last 50 or 60 years under proper management; the flowering scape is cut off as soon as four feet high, when, evidently, axillary branches continue the growth of the plant; which is thus kept so long alive by being prevented from flowering.

* * * * *

"With the name of longifolia I designate the variety known as Sacci and extensively cultivated in [318 (30)] Yucatan. It is principally distinguished by its much longer spiny leaves 4—5½ feet long 3½—4 inches wide, flowers very similar to those of the wild plant, but the filaments greenish. A. fourcroides, Jacobi Ag. 107, probably belongs here, and A. elongata, Jacobi, 108, I would refer to this form if the description did not expressly mention a channelled terminal spine.

"Agave Sisalana is the name that Dr. Perrine gave to the plant known to the natives of Yucatan as Yaxci, the most valuable of the fibre producing Agaves, and which was introduced by him into South Florida some thirty-five or forty years ago, during his efforts to acclimatize commercially valuable tropical plants in that almost tropical portion of our territory, efforts which were aided by Congress by a large

Nomenclature

grant of land, but which were destroyed, together with his own life, during the subsequent Indian wars. With this Agave, however, he has been successful, as it is now fully naturalized, and is quite abundant at Key West and the adjacent coast."

SUMMARY OF REASONS FOR NAMES.

* * * * *

Remarks on Sisal.

The assumption underlying certain of the conclusions just quoted, that the **Agaveæ** are prone to vary within rather wide limits has influenced systematists undoubtedly, but no evidence has ever been recorded to confirm it, and so far as species naturalized or cultivated in India are concerned, we should be led to just the opposite conclusion.

All that we can draw from the facts given by *Engelmann* and others is that there are certain **Agaves** in *Yucatan* to which local native names have been attached viz., (i) *Yaxci*, (ii) *Sacci*, (iii) *Babci*, (iv) *Citamci*, (v) *Chelem*.

Henequen, as *Engelmann* points out, is a general term, and so probably are "*Pita*" and "*Istle*"; "*Chucumci*" seems to be the same word as the "*chichimecae*" of *Hernandez* (l. c. p. 271) which he states expressed the Indian mode of cooking portions of the leaves for food (*cf. Martius l. c. p. 192*). Probably this also is a comprehensive term rather than the name of a particular plant.

Martius, who appears to have consulted several works that are not mentioned by *Engelmann*, states that in the language of the Maya tribes of Yucatan "*Qui*" or "*Quil*" signifies the plant from which fibre is got as well as the fibre, and enumerates as different sorts (i) *Sac-qui* (*Sosquil*), (ii) *Yas-qui*, (iii) *Chulul-qui*, (iv) *Chelem*.

Of these the **Yas-qui** or **Yash-qui** is from the description manifestly *Engelmann's* No. (i), and is **A. sisalana.**

The best form cultivated in the district of Merida. Yucatan.

It would seem that the **Sacqui** ranks highest in the estimation of the natives, and this evidently is the plant that is cultivated on a large scale in the district of which Merida (Sisal* is a port of Merida) is the centre, and figured at p. 24 of *Kew Bulletin No. 62 Feby. 1892* (*CCXXVII*, **Sisal Hemp**). In the same Bulletin, (p. 31) it is clearly shewn that the **Yucatan** field **Agave** is quite distinct from that which *Dr. Perrine*, who

* The busiest fibre port now is said to be Progreso.

nenclature.

~~SUMMARY OF REASONS FOR NAMES.~~

Sacqui, ~~is an Agave of Sisal type.~~

was many years at Campechy, selected as the best for the Florida plantation, and that he selected wisely.

Martius supposed the **Sacqui** might be a **Furcræa,** but the sketch already mentioned and the descriptions suggest an **Agave** of the **Sisalana** type, with a stout trunk, however, and generally more the habit of a **Yucca.** The flowers have been seen at Kew, and the plant pronounced to be probably 'var. *elongata*' of (Engelmann's) *A. rigida.* We do not know on what material *Engelmann's* description of the type of "*rigida*" was founded, but he evidently meant to indicate the "wild" original of the field **Sacqui.** Pending further exploration it can hardly be regarded as established that the wild originals of either **Sacqui** or **Yash-qui** have been found or exist anywhere.

Both have evidently been in cultivation by the *Mayas* from a great antiquity, and we propose until more is known of the **Agaveæ** of Yucatan to refer to them as,—

~~Adopted name for Sisal.~~

Yash-qui.

Sacqui=A. longifolia, *Engelmann*

Yash-qui=* A. sisalana, *Perrine*

From *Martius'* history it seems possible that a third species has been cultivated in *Yucatan* and that this was **A. Ixtli** of *Karwinski. Mr. Dodge's* account of the **False Sisal** found on and near the coast of Florida makes it not unlikely that this was unintentionally introduced along with "**Sisalana**" and has meantime been described again (from Florida) as **A. decipiens** of *Baker.*

Remarks on A-decipiens.

It is condemned by the North American experts, but the qualities assigned to it would not necessarily prevent its being used in its native country; more particularly if it be the fact, that a good deal of local fibre has for many years been shipped from the Gulf of Mexico to be mixed with other staples. Although existing solely in Botanic Gardens in India we include **A. decipiens** *Baker,* in our descriptive list of Indian **Agaveæ,** as it should be known, if only to be avoided for the reasons given by the authorities at Kew and Washington.

The result of the above examination of the authorities and material available in India may be summed up as follows so far as identity of species is concerned.

* Strictly, this should be **A. sisalana,** *Perrine* (Engelmann), but the above is less cumbrous.

REVIEW OF PRECEDING SUMMARY.

* The following **Euagaves** are more or less completely naturalized in different parts of India, viz.,

A. unidentified; perhaps allied to **A. Keratto** *Miller*—seen from Burma only,—fibre not known;

D. **A. Vera-Cruz** *Miller.* = *A. lurida H. B. C.* (not of *Jacquin*, doubtfully of *Aiton*),—fibre not fully known;

E. **A. Cantala** *Roxb.*—fibre exported from Bombay with that of other species; often, but wrongly called '*Agave vivipara*';

F. unidentified; approaches **A. sisalana,** *Perrine* and may possibly be *Engelmann's* "*A. rigida, Miller*" or a closely allied form; there is some ground for supposing that this plant is grown as '*A. elongata*' in the West Indies;—received in H. B. C. under the name of "*A. mexicana*" which, as shewn above, is unmaintainable;—fibre wants to be reported on;

H. unidentified,—planted in Bengal and in the Ganges "Doabs"; naturalized at Saharanpur, and there (wrongly) named "*A. lurida*"; probably allied to **A. sisalana,**—fibre wants to be reported on;

J. **A. Wightii** (nobis) = A. *vivipara*, Wight (not of *Linnaeus* or of *Lamarck*),—fibre reported on as good, but shorter than **A. sisalana.**

Of the remaining species of **Agave** in the Descriptive List (Part I) **B** (**A. americana,** Linn.) and **C** are not naturalized or grown except as ornamental garden plants in India, while **G.** = **A. sisalana** is a comparatively recent introduction. It is believed, however, to be spreading in some places spontaneously.

Only one **Furcræa** has so far shown any tendency to become naturalized in India, which is usually identified with **F. gigantea,** *Vent.* We think this may be rather **F. Commelynii,** Salm-Dyck, but information as to it is very scanty.

* While this was in the press specimens have been received from the Tanjore and Tinnevelly Districts of Madras through Mr. C. A. Barber, F. L. S., Government Botanist in that Presidency, to whom we are greatly indebted for specimens of a small-leaved **Agave** with a granulated cinnabar-coloured terminal spine; this species is said to be planted on mud walls, as a sort of coping apparently. Its characters and uses are still under enquiry.

BIBLIOGRAPHY.

BIBLIOGRAPHY ON AGAVE.

It is hoped that the references in the text will be found sufficient as regards the authorities mainly consulted; but the subjoined list of the more interesting or important publications bearing on the subject may be found useful, though it is far from exhaustive, and cannot profess, even from the writers' standpoint, to be complete. This does not include standard works of reference on Vegetable Physiology and Systematic Botany (from *Linnaeus* onwards) unless for some special reason, and the same applies to local floras also.

There are certain works which we have been unable to study, that should have a place in a complete Bibliography of the **Agaveæ**, such as—

PETER MARTYR, *de rebus Oceanis et de Orbe Novo*, etc.—Basle 1533.

ALDINUS, *Horto Farnesiano—Rome* 1625.

RODATI, *Index, etc., Bologna 1802.*

BOISSIER, *Voyage dans le Midi de l'Espagne—Paris 1839—1845.*

BOREAU, *L'Agave americana et descr. de quelques plantes nouv. ou peu connus.—Angers 1850.*

PAYNO, *Memorie sobre el Maguey mexicano y sus diversos productos.—Mexico 1864.*

Of other works, the following are the more important or interesting:—

CLUSIUS, *Rariorum aliquot stirpium per Hispaniam observatarum historia, Antwerp, 1576.*

CLUSIUS, *Exoticorum Libri Decem, Antwerp 1605.*

CÆSALPINIUS, *De Plantis, Florence 1583.*

DALECHAMP, *Historia generalis plantarum, Lyons 1586.*

MATTHIOLUS, *De Plantis Epitome, ed. Camerarius, Frankfurt am Main 1586.*

MATTHIOLUS, *Kreuterbuch, ed. Camerarius, Frankfurt am Main 1590.*

GALUANO, *Discoveries of the World published in English by Richard Hakluyt,* London 1601.*

* For other Travels and Accounts of this period see Sir H. Sloane's Catalouge under Aloe.

BIBLIOGRAPHY.

Bodaeus Scaliger and Constantinus, *Theophrasti Eresii de historia plantarum libri decem, etc., Amsterdam 1644.*

Hernandez, *Rerum medicarum Novae Hispaniae Thesaurus Ed. Anton. Recchi, Rome 1651.*

Munting, *Aloidarium—Amsterdam 1680.*

Ray, *Historia Plantarum, London (typ. Maria Clark) 1686—1704.*

Sloane, *Catalogus plantarum, etc., London 1696.*

Plukenet, *Almagestum botanicum, and Phytographia, London 1696.*

Jan Commelin, *Horti Medici Amstelodamensis descriptio, etc.—Amsterdam* 1697—1701.

Boerhaave, *Historia plantarum, "Rome 1727."*

Rumphius, *Herbarium Amboinense, Vol. V, Amsterdam 1745.*

Aublet, *Histoire des plantes de la Guiane, etc., London and Paris 1775. (Vol. I, Agave.)*

Hill, *Vegetable System, vol. XXIII, London 1773 (Aloe).*

Patrick Browne, *History of Jamaica, London 1789.*

Philip Miller, *Gardener's Dictionary, viii ed., London 1768.*

Philip Miller, *Gardener's Dictionary, IX ed., (Martyn's), London 1797—1804.*

Thornton, *"A new Illustration of the Sexual System of Linnæus" with plates in separate volume, London 1799.*

Buchanan (*afterwards* Hamilton) *"Journey to Mysore," London 1807.*

Ainslie, *Materia Medica of Hindoostan, Madras 1813.*

Roxburgh, *Flora Indica, Ed. Carey, Calcutta 1832.*

Humboldt, Bonpland *and* Kunth *Nova Genera et Species plantarum, Paris 1815—25.*

Humboldt, *Essai Politique de la Nouvelle Espagne, Paris 1825.*

Schiede, *"Botanische Berichte aus Mexico" in "Linnaea" Vol. IV, Berlin 1829.*

Zuccarini, *Plantarum Novarum * * in horto Monacensi Fasc. 1, Ratisbon 1832.*

BIBLIOGRAPHY.

ZUCCARINI, "*Ueber einige Pflanzen aus den Gattungen Agave und Fourcroya,*" *in Nova Acta Phys. Med. Acad. C. Car. Leopold. Nat. Cur., Breslau and Bonn 1833.*

BERTOLONI, *Flora Italica, Vol. IV* (*Agave*),—*Bologna 1839.*

DE VISIANI, *Flora Dalmatica* (*Agave*),—*Leipzig 1842—52.*

ROYLE, *Illustrations of Himalayan Botany, London 1839.*

MOORE, *in Gardener's Chronicle No. 37 of 1849* (*London*) *on an Agave that flowered in the Apothecaries' Garden at Chelsea during 1849.*

MARTIUS, *Beitrag zur Natur—und Literatur—Geschichte der Agaveen,—Munich 1855.*

MARTIUS, *Flora Brasiliensis Vol. III, Pt. I, Leipzig c. 1855.*

ROYLE, *Fibrous Plants of India, London 1855.*

ALPH. DE CANDOLLE *Géographie Botanique Raisonnée, Paris and Geneva 1855.*

MARTINS CH. "*De l'introduction à Europe de la naturalisation et de la floraison de l'Agave americana.*"—*Bull. Soc. Bot. de France II, 1855.*

MARTINS CH. "*Des circonstances qui peuvent determiner la floraison de l'Agave americana*".—*Bull. Soc. Bot. de France VIII, 1861.*

ERNST MEYER, "*Die Europaische Agave und ihre ursprungliche Heimath.*"—*Bot. Zeitung 1865, p. 384.*

SCHLECHTENDAL, "*Munting's bluhende Agave.*"—*Bot. Zeitung 1865, p. 384.*

JACOBI* *on Agaveæ, in Sitz. Schles. Gesell. für Vaterl. Cultur* (*see Gartenflora 1868, p. 346*).

JACOBI, "*Ueber den Bluthenbau der Agave*" *in Sitz. Schles. Gesell. 1869* (*see Bot. Zeitung 1869, p. 846*).

BLASQUEZ† P. and I., "*Memorie sobre el Maguey Mexicano*" *Mexico 1865* (*Reviewed in Bull. Bot. Soc. de France Bibl. 1867*).

* In 1864 and 1870 at Hamburgh a separate work appeared as "*Versuch zu einer systematischen Ordnung der Agaveæ,*" but the above paper and certain others not seen by us constitute the authority for his species.

† These authors are sometimes said to have proposed to alter the name *A. americana* to "*A. Maximiliana,*" but their actual contention seems to have been that the term *Maguey* covers several species, one of which they held to be undescribed, and for this they proposed the name *A. Maximilianea.*

BIBLIOGRAPHY.

Le Grand, "*Sur la naturalisation dans le Roussillon de l'Agave Americana.*"—*Bull. Bot Soc. de France XVII, 1870.*

Engelmann, "*Notes on Agave*" *Transactions of Academy of Science of St. Louis iii, 291—322, 1875 and in* "*Botanical Works*" (*posthumous*), *Cambridge Mass. 1887.*

Hoffmann, "*Areal der Agave americana in Europa als Freilandpflanze,*" *Gartenflora 1875, p. 70 and t. 825.*

Braun, *on the growth of Agaveæ* (*Sitzungsber. der Gesellschaft Natur-forschende Freunde zu Berlin, quoted in Bot. Zeitung 1876, p. 347*).

Jackson, "*Uses of Agave Americana,*" *in Pharmaceutical Journal, 3rd ser., vol. V. 461.*

Baker, "*The Genus Agave*" *in Gardener's Chronicle N. S. VII, VIII, 1877* (*London*).

Baker, "*The species of Fourcroya*" *in Gardener's Chronicle, N. S. XI, 1879* (*London*).

De Candolle, *Origin of Cultivated Plants* (*Eng. Translation, London 1884*).

Terraciano, *Primo contributo ad una Monografia delle Agave, Naples, 1885.*

Danielli, "*Sull' Agave Americana Linn.*" *in Nuovo Giorn. Bot. Ital. vol. XVII, Fasc. II, Florence 1885.*

Hemsley, *Biologia Centrali-Americana, Botany, Introduction and Appendix, London, 1888.*

Engler and Prantl, *Naturlichen Pflanzen-Familien* (*Amaryllidaceae*), *Leipzig 1889.*

Watt, *Dictionary of Economic Products of India, Vol. I, A. 602—640 and Vol. III, F. 749.*

Kew Bulletin

Article	v	*Sisal Hemp*	... ...	*1887*
„	vi	*Mauritius Hemp*	...	*1887*
„	xxiii	*Mexican Fibre or Istle*	...	*1887*
„	cxvii	*Fibre Industry at the Bahamas*	... ...	*1889*
„	cxxvi	*Cool cultivation of Tropical and Subtropical Plants*	...	*1889*
„	cxxxv	*Bombay Aloe Fibre*	...	*1890*

BIBLIOGRAPHY.

KEW BULLETIN—*contd.*

Article	CLIII	*Fibre Industry at the Bahamas ... ...*	*1890*
,,	CLXX	*Mexican Fibre or Istle ...*	*1890*
,,	CCI	*Bahamas Industries ...*	*1891*
,,	CCXXIII	*Agaveae and Arborescent Liliaceae on the Riviera ...*	*1892*
,,	CCXXVII	*Sisal Hemp ... ...*	*1892*
,,	CCXLIX	*Sisal Hemp in the Bahamas*	*1892*
,,	CCLVII	*False Sisal of Florida ...*	*1892*
,,	CCLX	*Caraguata Fibre ...*	*1892*
,,	CCLXXVIII	*Sisal Hemp Industry in Yucatan ... ...*	*1892*
,,	CCLXXX	*Bombay Aloe Fibre ...*	*1892*
,,	CCC	*Manila Aloe Fibre ...*	*1893*
,,	CCCXIX	*Fibre Investigations in the United States ...*	*1893*
,,	CCCXXXI	*Henequen Hemp in Yucatan*	*1893*
,,	CCCXXXVII	*Poling in Agave Plants ...*	*1893*
,,	CCCXXXIX	*Resources of British Honduras ... ...*	*1893*
,,	CCCXC	*Sisal Hemp at the Bahamas*	*1894*
,,	CCCCXXVII	*Sisal Hemp in the Bahamas*	*1894*
,,	DXVIII	*Sisal Cultivation in the Turks and Caicos Islands ...*	*1896*

MULFORD, A I., "*A study of the Agaves of the United States,*"—*Missouri Garden Report, Seventh Annual, 1896.*

DODGE, "*Useful Fibre Plants of the World*" *in Rept. No. 9 U. S. Dept. of Agriculture,—Washington 1897.*

ROSE, "*Notes on Useful Plants of Mexico*" *in Contributions from the U. S. National Herbarium, vol. v, Washington,* 1897—1901.

UNDER-SECY. FOR AGRICULTURE, QUEENSLAND, "*Sisal Hemp in Queensland,*" *Agricultural Journal, Vol. I, Pt. 5, Brisbane, 1897.*

WOHLTMANN, "*Der Hanfbau in Deutsch-Ost-Afrika*" *in Tropenpflanzer, 1898.*

BIBLIOGRAPHY.

STUHLMANN, "*Notizen ueber die Governments Pflanzung Kurasim*" *in Tropenpflanzer, 1899.*

PRAIN, *Bulletin No. 5 Dept. of Land Records and Agriculture, Bengal, "Agave Sisalana,"—Calcutta 1899.*

BOEKEN, "*Der Sisalhanf*" *in Tropenpflanzer, 1900.*

DUNSTAN, *Technical Reports on Fibres, pp. 58 and 96, in Imperial Institute Reports 1903.*

DEWEY, "*Principal Commercial Plant Fibres,*" *in United States Department of Agriculture Year Book 1903.*

MANN (H. H.) *and* HUNTER, "*Sisal Hemp Culture in the Indian Tea Districts*" (*Indian Tea Association's publications No. 3 of 1904*), *Calcutta 1904.*

DIRECTOR, BOTANIC GARDENS, STRAITS SETTLEMENTS, "*Fibre Plants,*" *in Agricultural Bulletin of the Straits and Federated Malay States, pp. 405, No. 10—Vol. III, Singapore, October 1904,*

also

SQUIER, *Tropical Fibres &c., London and New York, 1863.*

BROWN, R. N., *A Handbook of the trees, etc., in the Agri.-Horticultural Society's Garden and neighbourhood of Madras,* with supplement by J. J. WOOD, Madras, 1866.

MOERMAN, *The Ramie,—translated from the French by E. D. de Dombal, Calcutta (Bengal Secretariat Press) 1874.*

LIOTARD, *Memorandam on Materials in India suitable for the manufacture of Paper, Calcutta (Home, Revenue and Agricultural Press) 1880.*

SPON'S ENCYCLOPÆDIA, *Divn. III, "Fibrous Substances," London 1882.*

IMPERIAL INSTITUTE SERIES OF HAND-BOOKS (INDIAN SECTION) *No. 12, Fibres used for Brush-making, Calcutta (Supdt. Govt. Printing, India) 1893.*

GUILFOYLE, *Fibres from Plants indigenous and introduced .... in Victoria, Melbourne (Australia) 1894.*

KEW BULLETIN (SELECTED PAPERS) ADDL. SER.* II. *Vegetable Fibres 1898.*

NELSON, *The Agaves,—(Reprint from Year-book of Dept. of Agriculture, U. S. A.), Washington? 1902.*

* This includes in a single volume all the articles quoted separately by us above with others on fibres.

BIBLIOGRAPHY.

CONTER, *The cultivation of Sisal in Hawaii, Honolulu 1903.*

EDWARDS, *Maguey in the Philippines (Farmer's Bulletin No. 10, Philippine Bureau of Agriculture), Manila 1904.*

Upon economic points several other works have been consulted or might with advantage be referred to, where accessible, *e. g.*

ARRUDA DA CAMARA, *"Dissertacao sobre as plantes de Brazil que podem dos linhos &c." Rio de Janeiro,* 1820.

BERNARDIN, *Nomenclature Usuelle de 550 Fibres Textiles, &c., Ghent 1872.*

ERNST, A.—*Descriptive Catalogues of Venezuelan products, Philadelphia, Caraccas, and Columbian Exhibitions, 1876, 1883 (pub. 1886), and 1893.*

VETILLART, *Fibres Végétales Textiles, Paris 1876.*

SAVORGNAN, *Piante Tessili, Milan 1891.*

WIESNER, *Indischen Faserpflanzen (in Sitzungsbericht K. Akad. Wissensch.), Vienna 1870.*

Also papers in the Journal of the Society of Arts by Mr. *J. F. Watson* and Sir *Daniel Morris.*

Recent advances in the method of extracting fibre from the *Agaveae* in their native country are treated in a work by *Dr. F. Martinez Calleja* (Explotation de los Textiles, Mexico 1895) quoted in a Bulletin of the *Hawaii Agricultural Experiment Station* (No. 4 already cited) which contains in brief compass much that is interesting, from the planter's point of view particularly.

PART III.—GLOSSARY.

GLOSSARY.

THIS takes in a somewhat wider field than the preceding parts, because current and vernacular names of plants and their products are not regulated or defined on any system. We have aimed at including all names of this class (so far as known to us) that appear to relate directly to the species treated in Parts I and II; but besides these there are sundry names or terms which are apt to be confused with those more properly applied to **Agaveæ,** or to products derived from them.

In India there is much confusion with regard to *Aloes* for example; while in America different products from the

INTRODUCTION TO GLOSSARY.

Agaveæ and **Bromeliaceæ**—to say nought of **Palms** and **Grasses**—have been almost hopelessly mixed up together.

In such cases other names have been included, with due explanations.

Marks used in dictionaries to denote modes of orthography which do not prevail in English are not followed in the Glossary, because, for one thing, a majority of the names dealt with were spelled,—with diversified success,—by those who used or published them, phonetically.

Different renderings of Indian local names have been in most cases entered separately, on grounds of convenience; and, for somewhat similar reasons, certain names attributed to the classical languages of India and West Asia, though perhaps no longer current, have been given a place in the Glossary.

"*French*," "*English*," or "*Spanish*" names that are chiefly current abroad are referred in doubtful cases to the language understood to be actually predominant in the country concerned.

As regards "Botanical references" the authority for scientific names printed in Italics should be sought in the second column; for others the writers of these notes are primarily responsible.

The original authority for vernacular names has been cited so far as was possible, but where specimens have been inspected we have quoted the source from which the specimen was directly communicated as our authority for the local designation:—thus for certain Indian names we quote the Reporter on Economic Products to the Government of India or the Government Botanist, Madras, because, though the name may have been previously recorded, it is from specimens collected by Sir George Watt, by Mr. Barber, or by Mr. Burkill that we have been able to identify the plant said to bear a particular name in a particular locality with some approach to certainty.

For the sets of specimens received from Madras we are greatly indebted to the co-operation of the Government Botanist and the Revenue authorities.

It is hoped that the Glossary may help to clear the way both for those who may be called on to pronounce on the identity and character of Indian 'Aloe' fibres and for all who are interested in them agriculturally or commercially. Those who have made a study of any like subject will be able to

INTRODUCTION TO GLOSSARY.

appreciate the intricacy of confusion that besets the local and vernacular terminology, as well as the loss and inconvenience due to it.

The chief difficulty is to keep the list within manageable bounds. In his catalogue of Fibre Plants of the World, from which we have derived much help, Mr. Dodge has observed (under "*Grass fibres*")—

> "while fibrous substance is extracted from many species of *Gramineae* the family of true grasses, the term is frequently applied to fibres derived from plants that are grasses in no sense of the word, and it is therefore misleading. Examples: '*China grass*' the fibre from a tall shrub (Boehmeria); '*Sisal grass*' the fibre from a fleshy leaved Agave; and '*Silk grass*' which may mean *Bromelia* fibre, or almost anything."

We must plead guilty to having omitted "Sisal grass" and would gladly have passed over a good many more that figure in our list, as it is; but it seemed better for the present to err rather on the side of inclusion.

We have not attempted to expound any purely botanical terms. Those employed in the text of Part I should not be found very difficult, and in any case, where a reader not versed in the botany of the *Agaveae* may want a decision, his best course would be to send an inner and an outer leaf, with some flowers in spirit (if the plant is poling), also a few pods if available, to a competent botanist for identification.

The column in the Glossary of references to Parts I and II of the Bulletin is meant to assist in finding matter bearing on the botanical history of the plant or plants to which the commercial or vernacular name is believed to refer. For economic or industrial details the Dictionary of Economic Products for India, or in case of other countries works such as Spon's Encyclopædia, should be consulted. Where only the author's name appears in the second column fuller references will be found under Bibliography (Part II, p. 78 and foll.) or on the pages quoted in the sixth column.

Glossary of local and commercial terms referring to the Agaveae (also certain other fibre plants) or to their products.

Name	Authority	Language	Where used	Scientific determination
Abaca	Spon; also Kew Bull. XXXI	Filipino	Philippine Islands	Musa textilis, Née
Abecedaire	Danielli	French	France	*Agave americana*
Abacaxi	Martius	Tupi Indian	Brazil	*Ananassa sativa*, Linn.
Acebar	Rumpf	Spanish	Spanish Colonies	Aloe vera, Linn.
Aceure	De Lecluse	Portuguese	Portugal	Ditto
Acibar	Ditto	Spanish	Spain	Ditto
Adam's Needle (1).	Spon; also Watt E.D.	English	Cosmopolitan	Yucca gloriosa, Linn.
Adam's Needle (2).	...	Ditto	Ditto	Agave sp.
Adam's Needle (3).	Guilfoyle	Ditto	Australia	*Yucca filamentosa*
African Hemp	...	Ditto	...	Sansevieria sp.
Agave Palo	H. B. K.*	Spanish	Central and South America (Mexico and Venezuela)	*Tillandsia recurvata*, Willd.?

* Humboldt, Bonpland and Kunth.

Page	Remarks
...	The *Manilla* hemp; to be distinguished from *Manilla Aloe fibre.*
85	Probably (D)=*A. Vera Cruz,* Mill. Applied to other plants besides.
...	The cultivated Pine apple, which has yielded fibre in America, Malaya, India, &c.
79	Introduced with the plant by the Spaniards and the Hollanders to their East Indian possessions. See *Acibar.*
79	De Lecluse says that this is a corruption of the next following. Cf. *Azul Champahra.*
79	From the Arabic *Sabr* or *Sabir,* pronounced, when the definite article is prefixed, as '*As-sibar.*' Though forms of the true *Aloe,* as distinguished from the 'American aloes' (*Agaveae*), are supposed to be native in S. Europe and India, the names given to the drug (to which by some writers '*Acebar,*' &c., are restricted), and often to the plants, are from the language of the Arabs, to whom the best sort of medicinal *Aloe,* derived from *Aloe Perryi,* Baker (confined to the island of Socotra), was known from antiquity.
78	The genus *Yucca,* which is at present placed with the *Liliaceae,* should probably be united with *Agave* and certain other genera in a distinct order (Agaveæ). All the species of *Yucca* are natives of Central America, where several are known as fibre- and also soap-producers. Fibre has been got from *Yucca gloriosa,* Linn., in India, where it thrives, and is said to be naturalised in Madras and in the outer Himalaya. Spon's information that a *Yucca* is naturalised in Bengal requires confirmation.
87, 105	Said to be applied in Kangra (Panjab) to an *Agavea* (A. Cantala, Roxb. ?).
78	Introduced into Australia and reported suitable for fibre extraction.
77	Abbreviated from '*African Bowstring hemp,*' produced by different African species of *Sansevieria.*
97, 98	Different species of *Tillandsia* (belonging to the order *Bromeliaceae*) known as 'Spanish moss,' &c., yield a kind of 'tow' principally used for stuffing mattresses, &c., classed in France as 'Crin Vegetal,' (Vegetable Hair). It is not known how this particular *Tillandsia* came to bear a name simila to the scientific designation of certain 'American aloes.'

Name	Authority	Language	Where used	Scientific determination
Agave Thread	...	English	Europe and America	Agave and Furcraea sp.
Agua de Miel	Miss. Gdn. Rept. 1896	Spanish	Central America (Mexico)	Agave atrovirens, Karwinski (and other species ?)
Agua Miel	Martius	Do.	Ditto	*Agave americana*
Aguardiente	...	Do.	Spain and Spanish Colonies	...
Ditto	Rose	Do.	Central America (Mexico)	Saccharum officinarum, Linn.
Aguardiente de Maguay	Miss. Gdn. Rept. 1896	Do.	Ditto	*Agave americana*
Allaguey	Fragoso (in C. Bauhin, also Sloane)	(Not known)	C. America (? Grenada)	*Agaveae* sp.
Aloe (1)	...	English, French, German	Cosmopolitan	Aloe sp.
Aloe (2)	C. Masson (Journeys I, 104)	English	India	Nannorhops Ritchieana, H. Wendl.

Page.	Remarks
...	Applied to fibre or prepared yarn obtained from different species of *Agaveae*.
97, 98, 100, 139, 140	The sap that exudes into the basin (*cajete*) formed by cutting out the vegetative cone or 'bud' of certain *Agaves* when about to 'pole', to obtain the '*Pulque*' or native cider of Mexico. Literally 'mead', 'honey water', or 'hydromel.' Some authorities state that a spirit (*Aguardiente*, see below) is got from this liquor by a further process; also vinegar.
Do.	The true *Agave americana* of Linnæus, our (B), does not seem to be one of the '*Pulque*' kinds, but in any case what Martius had in view was a different species.
98	'Fire-water,' or Brandy.
Do.	Rose states that the spirit sold at the present day in Mexico as '*Aguardiente*' is distilled from 'Cane,' presumably from molasses (but see the next, also '*Chinguirito*').
88, 98	See '*Agua de Miel*,' '*Chinguirito*,' and the preceding.
97	(By a misprint in Danielli *Allaguey*). Fragoso identifies his *Allaguey* with the *Fil y Agulla* of S. Spain which is our (D) = *A. Vera Cruz.* Mill. Probably corrupted from the Spanish '*El Maguey*,' Cf. '*Amaguey*.'
113	The species known under this name prior to the discovery of America belong to the genus *Aloe*, Nat. Ord. *Liliaceae*. The word is probably derived in Europe through the West Asian languages from an African original. Most of the true aloes are natives of West or South Africa and the adjacent islands; but at least one species is found in S. Europe and an allied form on the coasts of India; while another form (*Aloe indica* of Royle) occurs at the base of the N.-W. Himalaya. The leaves of certain species of *Agave* resemble those of the true *Aloe*, so that when the *Agaveae* of the new World came under notice they were classed with the *Aloes*, and this reference, though recognised scientifically as an error since the time of Linnaeus, has persisted in the popular vocabulary of different countries to the present. Economically the true *Aloes* are chiefly important as the source of a drug, while the *Agaveae* ('American Aloe,' etc.) are best known as yielding fibre.
...	A dwarf palm (Palmetto) found in the Indus Valley from the Salt Range southwards, and more abundantly in parts of Afghanistan and Beluchistan, called in Pashtu '*Mazrai*',—W. Panjab '*Pattha*,' and by the Biluch '*Pesh*' *etc.* Better known under Griffith's name of '*Chamaerops Ritchieana*,' having been referred by him to the same genus as the Mediterranean *Chamaerops humilis*, Linn. Like the *Palmettos* of Florida, now placed under *Sabal* and *Serenoa*, the Oriental Palmetto yields a fibre, but its local use is chiefly for 'grass-shoes' or sandals, binding strips, and matmaking (see *Pesh* and *Wild Aloe*). The 'fish' plant elsewhere mentioned by Masson is no doubt the same.

Name	Authority	Language	Where used	Scientific determination
Aloe Americana	Danielli	Italian	Italy	*Agave americana*
Aloe Boemica	Ditto	Ditto	Do.	Ditto
Aloe Fibre (1)	Dodge	English	India	*Aloe indica*
Aloe Fibre (2)	Balfour (Cyclopædia)	Ditto	S. India	*Agave americana, A. vivipara, Furcraea gigantea, Yucca gloriosa*
Aloe Fibre (3)	Imp. Inst. Hand book (Ind. Sect.), No. 12	Ditto	Do.	*Agave americana*
Aloe Fiorentina	Bertoloni	Italian	Italy	Ditto
Aloes (1)	...	English, French, German	Cosmopolitan	**Aloe**, species
Aloes (2)	Bojer Hort. Maur. p. 353	French	Mauritius	*Agave americana* Linn. (Sprengel)
Aloes a petites feuilles	Ditto	Do.	Dilto	*Agave angustifolia, Haw.*
Aloes d' Amerique	Danielli	Do.	France	*Agave americana*

Page	Remarks
85, 86, 118-120	In a recent article in the '*Gartenwelt*' M. Al. Berger (La Mortola) has observed that two variegated kinds occur on the Riviera, one of which is *Agave picta* of Salm Dyck, and quite distinct from *A. americana*, Linn., which would seem to be naturalized to some extent in that country. It is clear, however, that the *Agave* which is most commonly spontaneous on the Mediterranean coasts is our (D) *A. Vera Cruz*, Mill., and in S. Europe this is often called '*A. mexicana*' or '*A. americana.*' In Britain it has usually been called since Aiton's time '*A. lurida,*' but is sometimes ticketed '*A americana.*'
Do.	Possibly the true *Agave americana* of Linnaeus, as distinguished from the '*A. americana*' of S. Europe, which is commonly = D (*A. Vera Cruz*, Mill.).
...	Fibre from India was shown at the Chicago Exhibition of 1893 under this name as produced from '*Aloe indica.*' Along the coasts of W. and S. India another form of *Aloe* is found (*Aloe littoralis*, Koenig) which European botanists have usually regarded as a variety of *Aloe vera*, Linn., and fibre from this plant has been at different times prepared in India.
96	By *A. americana* is intended probably *A. Cantala*, Roxb. (E), and *A. Vera Cruz*, Mill. (D); by *A. vivipara* (J) of these notes, *i.e.*, *A. Wightii*, or perhaps (E) also. *Yucca* fibre has undoubtedly been handled in Madras, but the species is not, so far, ascertained properly.
96	In 1893 Mr. Thompson reported that 'Alce fibre' was used in his brush factory in the Nilgiris; Genl. M'Leod also reported that the fibre of the 'American aloe' had been used for brushmaking, and apparently brush fibre from *Agaveae* was readily obtainable in certain bazars. The plant intended by Genl. M'Leod seems to have been the '*Railway Aloe*' which is usually our (D), *i.e.*, *A. Vera Cruz*, Mill. (see also *Mexican fibre*).
111, 126	Probably = (D) which is *Agave Vera Cruz*, Mill.
107	The drug produced from *Aloe vera*, Linn, *Aloe Perryi*, Baker, and other species of true *Aloe.*
96	Bojer cites Andrews' Repository, but the plant which he saw naturalized was probably distinct from that which he says was grown in gardens.
88	Cf. *Anana de pite.*
118-120	'*American Aloe.*' See *Aloe americana* above.

Name	Authority	Language	Where used	Scientific determination
Aloes Pite	Aublet	French	S. America (French Guiana)	*Agave americana*
Aloes Pitta	Danielli	Ditto	S. France (Provence and Roussillon)	Agave Vera Cruz, Mill. (probably)
Aloes Pitte	Loiseleur-Deslongchamps (Flor. Gall. Ed. ~~I. P.~~ I. p. 239)	Ditto	France	*Agave americana*
Aloes Vert	...	Ditto	Mauritius	~~*Furcraea sp.*~~ *Agave foetida, L.* (Ehrengel)
Aloe	Visiani	Sclavonic	S. Europe (E. Adriatic littoral)	*Agave americana*
Amagury	Edwards	Filipino	Philippines (Pangamian and Zambales)	Agave sp.
American Aloe (1)	Smith (Dict. Ec. Plants)	English	Cosmopolitan	*Agave americana*

Page.	Remarks
98	Probably a *Furcraea*.
86, 112 126	Cf. *Pita*.
86, 112, 126	Agave (D) = *A. Vera Cruz*, Mill.
94, 95, 105	'*Mauritius Hemp*.' In Madras fibres have been shown which were ascribed to '*Agave viridis*,' meaning probably a species of *Furcraea* introduced from the Mauritius (see *Mauritius Hemp* and *Piet*, also *Green Aloe*).
86, 120, 126	= (D), *i.e.*, *A. Vera Cruz*, Mill.
...	Mr. Edwards states that two *Agaves* are grown in the Philippines for fibre, viz. *A. sisalana*, Perrine (our G), which he calls Henequin, and '*A. americana*'*. The second is probably not = (B), *i.e.*, the true *A. americana* of Linnaeus, and may cover more than one species, derived perhaps originally from the Pacific coast of Central America. The Agaves were first used commercially in the Philippines to supplement the stock of the true *Manilla Hemp*, which has long ceased to equal the demand; but their fibre now supports an independent industry. The word is probably corrupted from the Spanish '*El Maguey*' (see also *Manilla Aloe fibre*).
98, 99, 113	A comprehensive term for different species of *Agave*, which has spread everywhere since the introduction of *Agaves* into S. Europe where they were popularly compared with local species of *Aloe*. The *Agave americana* of Linn. is of comparatively minor economic importance, and the many references made to '*Agave americana*' as a source of fibre, beverage, &c., usually relate to some other plant, not always an *Agave* (see also *Amerikanische Aloe, Aloe Americana, etc.*).

* While this was in the press a specimen of the common naturalized Agave of the Philippines was received at Kew from Mr. Edwards and proved to be the Amboyna 'Aloe' of Rumpf, that is our (E) = Agave Cantala Roxb.

Name	Authority	Language	Where used	Scientific determination
American aloe (2)	Balfour (Cyclopædia)	English	India	*Agave americana*
Amerikanische aloe	...	German	Germany	*Agave americana*
American aloe fibre	...	English	India	.....
Amole	Dodge (also Miss Mulford, Coulter, Rose &c.)	Spanish	C. America	Agaveæ Spp
Anai Kathalai	Government Botanist Madras	Tamil	S. India (Tinnevelly)	Agave Vera Cruz, Mill.
Anaik Katraghai	Mukerji Descr. Cat. Ind. Prod. Amsterdam, etc, 1883	Do.	Ditto	Ditto
Anaik Katrazhai	Watt E. D.	Do.	Ditto	Ditto
Anai Kattalai	Government Botanist Madras	Do.	S. India (S. Arcot)	Ditto

Page	Remarks
99	The true *Agave americana* is not common in India, except as an ornamental plant in gardens, &c., while the term is popularly applied to more than one species of *Agave* (as well as *Furcraea*).
84, 86	In Northern Europe this title is usually applied to the true *Agave americana* of Linné, while the *Agave americana* (or American aloe) of S. Europe is, for the most part, *A. Vera Cruz*, Mill. (our D), which does not thrive as a rule out of doors in N. Europe.
105	Used to indicate the fibres locally obtained by different processes for cordage from different species of *Agave*, *Furcraea*, and *Yucca*. We have referred the *Agaveae* known to us as yielding American aloe fibre in India commercially to— (E) = *Agave Cantala*, Roxb. (G) = *Agave sisalana*, Perrine (J) = *Agave Wightii*; also (F) (unidentified). Besides these species (H) is mentioned as suitable for experiment; (D) is doubtful.
97	Several *Agaveae* possess detergent qualities. In the West Indies certain kinds of *Euagave* (*A. Morrisii*, Baker and *A. Keratto*, Mill. possibly also *Furcraea*) are or were generally used for scouring floors, &c., and from one or more of these a soap has been manufactured which can be used with salt water. The fine toilet soap made in Illinois is from a *Yucca*; but several *Agaves* of the *Manfreda* and *Littaea* groups yield scouring material in the United States and N. W. Mexico. These are known locally as "*amole*." The rootstock of the *amole* plants is said to be the part used: it is the leaf of the Euagaves in the West Indies. 'Amolilla' (Dodge) is a *Prochnyanthes* and not known in India.
83, 85, 86, 99, 103, 126, 131, 139, 147	(D) of this bulletin. See *Anai Kattaley*, etc.
[illegible]	Variously spelled 'Anak' or 'Anaik,' and the second part with a 'g' or a 'z.' Meaning not known to us. Cf. *Anai Kattalai* and *Kadanaku*.
Do.	See the preceding.
Do.	(D) of this bulletin. See *Anai Kathalai*, etc.

Name	Authority	Language	Where used	Scientific determination
Anai Kattaley	Balfour (Cyclopædia)	Tamil	S. India	*Agave americana*
Anai Kuttalei	Brown and Wood	Do.	S. India (Madras)	*Agave americana* Linn.
Anak Kattalai	Government Botanist Madras	Do.	S. India (S. Arcot)	Agave Vera Cruz Mill.
Anak Kattali	Ditto	Do.	Ditto (Coimbatore)	Ditto
Anakyitha	Ditto	Malayalam	S. India (Malabar)	Ditto
Anana de pite	Bouton (in Sloane)	French	Mascarene Islands	*Aloe Yuccae foliis*
Ananas	Watt E. D.	American native language not specified	Cosmopolitan	*Ananas sativa*, Linn.
Ananas Boaya	Rumpf	Malay	Amboyna, &c.	Agave Cantala Roxb.
Ananas bravo	Acosta	Portuguese.	S. W. India	Pandanus sp.
Ananas Costa	Martius	Ditto	Java	*Agave Rumphii*
Ananas Manso	Do.	Ditto	Portugal, Brazil &c.	*Ananas sativa*, Linn.
Ananas utan	Rumpf	Malay	Amboyna, &c.	*Agave Cantala* Roxb.
Arbol de las Maravillas	Acosta	Spanish	Spain, &c.	*Agave sp.*
Arbol de Maguey	Do.	Ditto	Ditto	*Ditto*

Page	Remarks
83, 84, 86, 95, 99, 124, 131, 147	The proper spelling, we believe, is 'Ane kattale;' *Kattale* is presumably = Rheede's '*Catevala*' ('Kanta wala' = prickly ?); and 'Kantala' (which see):— 'Ane' or 'Anai' we understand to signify the elephant in Tamil, &c., so that the prevailing name of (D) in Madras may be taken to mean "Elephant Aloe."
95	Evidently the same as the *Anai Kattaley* of Balfour.
83, 85, 86, 99, 106, 126 131, 139, 147	Variants, no doubt of '*Ane*' (or 'Anai') *Kattale*, which appears to be applied very uniformly in the Madras Presidency to Agave (D).
86, 147	Agave (D). The first element may be = 'Ane,' and the second = Kia (Pandanus).
117	Perhaps a *Furcraea*; but the 'Anana' suggests rather a Bromeliad. See also *Pitte Ahetz*, and *Laffa*. The *Bouton* quoted by Sloane was of an older generation, obviously, than the Editor of the Reports of the Natural History Soc. of the Mauritius.
...	Originally the pine-apple (Nat. Ord. *Bromeliaceae*); but in various parts of the world applied to sundry other plants; cf. *Nanas sabrang*, &c.; it seems to be given in Malaya to all plants whose leaves in shape and texture look like those of the pine-apple, fibre plants particularly.
88, 133, &c.	See *Nanas Boaya*.
...	See *Kyre & Mellis Cour*.
88, 133, 110	Martius thinks that this Agave, which has been identified with our (E) = *A. Cantala, Roxb.* was so named because brought to Java from the Indian Coast.
...	= Cultivated pine-apple.
88, 133 &c.	See *Nanas utan* and the preceding. The Portuguese in India likened the screwpine (*Pandanus*) to the American pine-apple, which they introduced to India and Malaya and the Malays have transferred the name either from the pine-apple or the screwpine to certain *Agaveae* (see *Nanas utan*, &c.).
110	See *Maguey*.
110	Ditto.

Name	Authority	Language	Where used	Scientific determination
Area	Linschotten (in Bauhin)	Guzerati ?	Western India (Guzerat)	Aloe sp.?
Area	Garcia del Huerto, Aromatum etc. ed. Clusius, Antwerp 1567.	Ditto	W. and Central India (Guzerat and Deccan)	*Aloe*, *Agave* or *Pandanus sp.*
Azul	...	Portuguese	Portugal &c.	Aloe sp.
Azul Champahra	Ruiz and Pavon	Spanish	Peru &c.	*Agave americana*
Bahamas Hemp	Kew Sel. Papers (Addl. Ser. II) LII	English	England and America	*Agave rigida* var.
Bakkul	Balfour (Cyclopædia)	Bengali	India (Bengal)	*Agave americana*
Balu rakkisa	Ditto	Telegu	S. India	*Agave americana*
Banada Kattala	Liotard	Telegu	S. India (Mysore)	*Agave variegata*
Banskeora (1)	O'Shaughnessy (Bengal Dispensatory, Calcutta, 1819)	Hindustani	N. India	*Agave vivipara*
Banskeora (2)	Watt E.D.	Hindustani	N. India	*Agave americana*

Page	Remarks
113	This may have been a Persian name, but seems to be used in the Malay Archipelago for a species of Pandanus. It is given here as it may still be in use locally. Unidentified fibres with a similar name have been exhibited in S. India.
113	The Arabic word for 'the sky' and so 'blue' &c. Applied apparently to some bulbous plant, possibly of the Squill family, and transferred by the Moors or the Crusaders to the aloe of S. Europe; later to the *Agave*. In Spanish "Azul" means blue, and is applied apparently to vegetable surfaces with a 'blue' or 'grey' (glaucous) tint such as the leaves of *Agave Vera Cruz*, Mill.
85	*Azul* is *Agave* as noted above, and '*Chaparra*' is 'a kind of oak'; perhaps the name (if not the *Agave* itself) came from some tract to which oaks extend on the Andes. Ruiz and Pavon say that their plant is common on cliffs in Peru, and is also found in warm valleys. The existence of any wild *Euagave* to the south of Columbia requires confirmation.
144, 146	See *Sisal Hemp*, &c.
96	Balfour meant perhaps the Bengal Presidency. No such name seems to be known for *Agave* in Lower Bengal; but it is a local term in parts of Central India for 'the fibrous bark of the roots of certain trees used' [in Malwa] * * * 'as a cheap substitute for string and cord,' (Dr. Tranter in Liotard, p. 65), and about 1852 '*Agave Cantala*' which is said to be common in Malwa was used as a substitute for the true '*Bakkul.*' The traditional '*Bakal*' is birch-bark from the Himalaya, while *Bacula* of the 'Asiatic Researches' was an epithet of several trees or herbs with fragrant flowers, *e.g.*, *Mimusops Elengi*, (Bengali 'Bokul').
105	Cf. *Rakus*, &c.
...	Probably *Agave americana*, Linn. var. *variegata*, from which fibre has been obtained experimentally. The compilers say the staple was shorter than that of 'Agave americana' fibre by which they doubtless meant (D).
91, 102 105, 121 123, 127 131, 133 137, 147	from '*Bans*'=bamboo, and '*Keora*'=screwpine: commonly applied from Behar to the E. Panjab to Agave (J)=*A. Wightii* of this Bulletin. At Saharanpur (E) and (H) are distinguished as *Rambanskeora*.
96	*Banskeora* seems pretty well restricted to (J)=*Agave Wightii*.

Name	Authority	Language	Where used	Scientific determination
Bara Kanur	Watt E. D.	Bengali	India (Bengal)	*Crinum asiaticum*, Linn. var. *toxicaria* Herb.
Bara Kanwar	Ditto	Hindustani	S. W. India	*Agave americano*
Barba De Palo	Dodge	Spanish	Central America (Venezuela) &c.	*Tillandsia usneoides*, Linn.
Barbadoes Aloes	Voigt (Hort. Sub. Calc.) etc	English	Cosmopolitan	Aloe sp.
Bas Kitri	Liotard	Hindustani	N. W. India (Rohilkand)	Agave sp.?
Bastard Aloe	Brown and Wood (also Balfour)	English	S. India	Agave Wightii (of this Bulletin)
Bastard Tequila	Rose	...	Central America (Mexico)	*Agave Sp.*
Bear grass	Dodge (and others)	English	Northern and Central America; also in Australia	Yucca Sp.

Page	Remarks
...	Cf. *Baskitri* and *Sodursun*, also the following.
96	'*Kanwar*' (Cf. *Kantala, Kenda, Catevala* and so forth) probably refers to the prickly leaves of the *Aloe* and *Agave*, but the 'Kanwar' of Central and W. India is confused with Kanwar (*Crinum*) on the one hand, and with species of *Pandanus* (*Keora, Kiakanta,* &c.) on the other. Cf. the preceding, *Baskitri* and *Sodursun*, also *Kunwar*.
..	Lit. Wood- or Tree-beard. Nat. Ord. *Bromeliaceae*. Cf. *Agave Palo* above.
...	A pharmaceutical term for the drug prepared from a true *Aloe*.
...	Liotard, quoting an epitome of local reports on paper fibres in the North-Western Provinces, says that in the Lalitpur District (towards Central India) a wild fibre plant occurred called *Soodursun* which was identified with a Rohilkand plant called *Baskitri*, from which paper was made at *Moradabad* (Rohilkand). As to the 'Soodursun' see *Sodursun* below: the *Baskitri* was perhaps Agave (J), Bas (scent) having been substituted for Bans (bamboo).
91, 147	The first *Agaves* to be imported into India were, as we believe, E = *A. Cantala*, Roxb.,—and J = *A. Wightii*. ('A. vivipara' of Wight). Both probably reached India by the Pacific from the Jalisco Province (now a State) of Mexico, where a somewhat similar distinction is kept up between the '*Tequila*' and '*Bastard Tequila*'. 'Bastard Aloe' seems to be in use in S. India only, and is probably a translation from some forgotten Portuguese appellation.
	Mr. Rose identifies the '*Bastard Tequila*' (which is presumably a translation of the local Spanish) of Western Mexico with the '*Huila*' of Bolanos in the State of Jalisco, and refers the *Huila* to an *Agave*, which differs from the true 'Tequila' by being smaller. *Tequila* is the capital of the State (formerly province) of *Jalisco*, on the Pacific, where ports were maintained for trade with the Indian Seas by the Spaniards. It seems not impossible that Mr. Rose's '*A. vivipara*' may be our Agave (E) (*A. Cantala*, Roxb.) or a nearly allied species, and that the *Bastard Tequila* may be Agave (J). Cf. *Bastard Aloe*.
78	Species of *Yucca* and *Dasylirion* which yield a fibre in the Southern States of the Union and in N. Mexico are called '*Bear grass*.' None of these have been introduced so far in India, unless horticulturally.

Name	Authority	Language	Where used	Scientific determination
Bhoortha Pharangi	Govt. Botanist Madras	Canarese	S.India (S.Canara)	Agave Cantala, Roxb.
Bhuttala	Watt E.D.	Canarese	S. India	*Agave americana*
Bilatee ananas	Roxburgh	Hindustani	India	*Agave Cantula*, Roxb. (Fl.Ind.) [A Cantala, Hort. Beng.]
Bilatte Nanas	Martius	Hindustani	India	*Agave Cantula*, Roxb.
Bilati Anannas	Voigt	Bengali	India (Calcutta)	*Fourcroya Cantula*, Haw. [Agave Cantala, Roxb.]
Bilati Pat	Watt E .D.	Do.	Ditto	*Agave americana*
Binder Twine	...	English	N. America, etc.	Agave spp.
Bitter Aloes	...	Do.	England, &c.	Aloe spp.
Bois Chandelle	Aublet	French	Mauritius	*Agave fœtida*, Linn.
Bois de Meche	Martius	Do.	Antilles	*Fourcroya cubensis*
Bois Meche	Aublet	Do.	Mauritius	*Agave fœtida*, Linn.

Page	Remarks
88, 133, &c.	'Bhurt' in different Indian dialects signifies a 'thorn' or 'burr' and 'faringi' is of course='frankish' or 'foreign.'
105 &c.	Perhaps this is (J), = our *Agave Wightii.*
87, 100, 105,129, 133, 135 to 139, 147	'Foreign pine apple' = (E) of this Bulletin. See also *Adam's Needle* (2), *Aloe fibre* (2), *Ananas boaya, Ananas costa, Bombay aloe fibre,* &c. Roxburgh says that *Bilatee ananas* is the 'Hindoo' name, (*i.e.*, in the lingua franca of 'Hindustan') see *Bilati Anannas* (Voigt) also.
Do.	Martius appears to be quoting a paper, which we have not seen, by Blume.
Do.	A Serampore Garden name perhaps, and Roxburgh may have got it from Carey.
96	Meaning 'foreign fibre;'—Cf. *San ka Nar.*
96	Twine made from vegetable fibre used for tying sheaves at harvesting. One of the chief uses of the *Agave* fibre commercially is, or was recently, to supply the demand for Binder twine, in the U. S. A. especially. Binder *strips,* cut or torn from the raw leaf of certain species [in India (D) and (E)] are used in the N. of Madras (Burkill) and in the Philippines (Edwards) for tying bundles of tobacco (for drying?).
127	The pharmaceutical substance obtained from different species of true *Aloe.*
94, 95, 97	From the 'chandelier' inflorescence: a *Furcraea.* See the next.
94,95,97	Martius, referring to *Labat's* 'Voyage aux Isles,' notes that the *Bois de Méche* (*i.e.*, 'Tinder-or Match- tree') yielded fibre, and that the pith of the stem (flowering scape) was used for tinder and for corking phials, etc. *Agave* and *Furcraea* were perhaps best known to the early voyagers owing to the dry 'poles' furnishing a handy substitute for tinder to mariners. The name crossed from the Islands to Guiana, and travelled thence to the Mauritius. See *Bois Meche,* and *Tol, Mauritius Hemp, Piet* and *Pite* also.
94, 95, 97	*Agave fœtida* of Linnaeus is *Furcræa gigantea* Vent.; but Aublet goes on to quote a synonym from Plukenet which is *F. tuberosa,* Ait. Both were probably known in Guiana (whence the *Pite* came to the Isle de France), but the species now grown in the Mauritius is perhaps still a third; see *Mauritius Hemp,* etc.

Name	Authority	Language	Where used	Scientific determination
Bombay Aloe	Dodge	English	England &c.	*Agave vivipara*
Bombay Aloe fibre	Kew Sel. Papers (Addl. Ser. II) LX & LXI	Do.	England	*Agave vivipara* Linn.
Bombay Hemp	D/	Do.	Do.	*Ditto*
Bontha Kithanara	Govt. Botanist Madras	Telugu	S. India (Godaveri)	Agave V/ Cruz, Mill.
Bowstring Creeper	Dodge	English	India	*Marsdenia tenacissima*, W. and A.
Bowstring Hemp (1)	Roxburgh	Do.	Do.	*Sanseviera Zeylanica*, Willd.
Bowstring Hemp (2)	Madras Exhibition Cat. 1855	Do.	S. India (Masulipatam)	Agave sp. ?
Bowstring Hemp (3)	Martius	Do.	India	*Sanseviera lanuginosa*, Willd.

Page	Remarks
138	The reference is to '*Bombay Aloe Fibre*' (which see), but the name has been given in India to several distinct species, including our (E). *A. vivipara* of Wight, = our (J) or *Agave Wightii*, is sometimes called 'the Bombay Aloe,' but yields comparatively little perhaps of the '*Bombay Aloe fibre.*'
138	When the export of '*Aloe fibre*' from India recently attracted notice in England, the chief port of export was Bombay, and the staple seems to have been known commercially as 'Bombay Aloe fibre.' Specimens of a plant supposed to yield the commercial product sent for determination were referred to *A vivipara*, Linn., a name which, for reasons given under Part II, we recommend should be dropped altogether. 'Aloe fibre' was originally shipped (from Madras ports—chiefly) about 1854—60, when the flax and hemp trades were depressed it is believed in Europe, but the export died away again. Some fifteen years ago the Indian trade revived,—through Bombay this time,—but the fibre was got mainly from Madras and Central India, and derived from various species. That now exported and largely grown near Bombay city is mainly from our *Agave* (E.), *i.e.*, *A. Cantala*, Roxb. (naturalized) and *A. sisalana*, Perrine (planted).
...	See the preceding. Usually applied, however, to *Crotalaria* and *Hibiscus* fibre.
86, 147	(D) of this Bulletin. Cf. *Kithanara*, etc., also *Kalabuntha*.
...	See *Bowstring Hemp* (1) and (2).
77	Roxburgh's experiments on Indian fibres led him to give the "*Moorva*" or "*Moorgalie*" plant a high place economically; but he considered that the strongest of all was that yielded by a twiner of the same order as the *Yercum* (*Calotropis*), his '*Asclepias tenacissima*' (now referred to *Marsdenia*), called in the Rajmehal hills of Bengal '*Jetee*' or '*Jiti.*' *Sansevieria* fibre he called '*Bowstring Hemp,*' and the name has been extended to other species used in Africa, America, etc. In India *Sansevieria* is understood to be mixed with *Agave* fibre occasionally; its local names are apt to be confounded with those of *Agaveae;* see next item, also *Morva, Murga, Maurvi, Muruvu-dul, Sagenara;* etc. Cf. also *Anana de pite, Pitta Ahetz* and *Laffa.* 'African Hemp' is properly 'African Bowstring Hemp' and from an East African *Sansevieria.*
77	The vernacular equivalent '*Saganara*' (which see, also *Saganara Matha*) is applied in the South to an *Agave* fibre; on the other hand *Saganara, Saugu*, etc., *may* be given to the *Marsdenia* as well, if it occurs in Coromandel, or the fibre may have been from *Sansevieria.*
77	The scientific name is Sprengel's (Syst. Ed. XVI, Vol. 2, p. 93). His plant seems to have been a *Cordyline*, or at all events not a *Sansevieria* and was from Madagascar; Martius, however, evidently meant to refer to Roxburgh's *Sanseviera.* Cf. *Pitta Ahetz*, etc.

Name	Authority	Language	Where used	Scientific determination
Bramarakashie	Madras Exh. Cat. 1857	Tamil	S. India	*Agave sp.*
Bramha rakasi	Balfour (Cyclopædia)	Do.	Ditto	*Agave americana*
Bromelia pita	Squier (also Dodge)	Spanish	Mexico	*Bromelia sylvestris*
Broomroot	Kew Sel. Papers Add. Ser. II. Arts. LXXIX, LXXX (also Dodge)	English	Cosmopolitan	Epicampes macroura *Bth.*
Brush fibre (1)	Madras Exh. Cat., 1855	English	S. India	*Agave Cantula*
Brush fibre (2)	...	Do.	England and America	.....

Page	Remarks
96	See the next, and *Rakas*.
96	Cf. *Rakas*, etc. 'Brahm' or 'Birm' is prefixed to the names of various prickly plants throughout India.
93	The history of this '*pita*' is much tangled, but it is quite clear that the true '*Pita bromelia*' (? a local Spanish name) is furnished by one or other of the *Bromeliaceæ* and not by any *Agave*. Confusion has arisen because the term '*Ixtle*' or '*Istle*' (which see) is applied in some parts of Central America to one or more *Bromeliaceæ*, in others to one or more of the fibre *Agaveae*, while in N.-W. Mexico it applies to the '*Lecheguilla*' or '*Cabbage*' Agaves, which are the main source of '*Tampico fibre*.' Chief Justice Temple of the High Court at Belize (Brit. Honduras), in a paper read before the Society of Arts in 1857 (Vol. V., p. 125) explained the distinction between the *Euagave* fibre and the '*Silk grass*' of Honduras, which is the *Bromelia Pita*, or closely akin to it, and contrasted samples of the *Honduras Silk grass* or *Pita Bromelia* with samples of *Henequen* (*Agave sisalana*, Perrine or a near ally). See also *Istle*, *Silk grass*, *Brush fibre*, and *Pita Bromelia*.
...	In the Indian Agriculturist of December 12th, 1891, in an article on Brush-making and Brush staples in India, it is stated,—"*Mexican is produced in South America from the American Aloe* (*Agave Americana*) *and is very largely used in brush-making, &c.*" Under *Aloe fibre* (3) the use of Agave fibre for brush-making *in India* has been treated. The fibre known to the trade in England, however, is not got from any of the *Agaveæ* at all, but from a true grass (Nat. Order *Gramineæ* genus *Epicampes*). This is called '*Mexican*,' or '*French*' Whisk as distinguished from the original '*Venetian Whisk*,' which is a *Chrysopogon* (also a true grass) common in S. Europe, also in the Himalayas; see *Brush Fibre*. 'Broom *root*,' it may be noted, is again quite a different thing from 'Broom *corn*,' a *Sorghum* (Nat. Ord. Gramineæ) which abounds in parts of India, and has been carried to the U. S. A., where it is locally grown and used for brush-making. Brushes are made throughout India, usually by gypsies, from the roots or stems of different grasses, in Madras called 'Broom sticks.' See *Aloe Fibre* (3), *Bromelia Pita*, *Brush Fibre*, *Mexican Fibre* (1), *Mexican Whisk*, *Istle* (1), &c.
96	Dr. Riddle of Hyderabad exhibited samples of cloth made wholly or in part with the fibre of a plant described as '*Agave Cantula*,' also furniture brushes made from the remnants of the Aloe fibre. In N.-W. India it is said of Agaves (E) and (J) that the 'butt' of the leaf yields a coarser fibre suitable for brush-making. Rude brushes are made from the leaf of certain species in S. India, as from different Agaves in W. Mexico, by simply cutting off the base of the leaf from the blade, and using the 'neck' as a handle. See also *Aloe fibre* (3), *Broom root*, and *Reju*.
96	Largely obtained from *Agaves* of the *Littaea* section, not so far naturalized in India. See *Mexican fibre*, *Ixtle* (3), *Tampico fibre*; and Cf. *Aloe fibre* (3), *Broom root* (1), *Mexican fibre* (1) also the preceding.

* *i.e.*, '*Mexican*' fibre.

Name	Authority	Language	Where used	Scientific determination
Buddu Kattale Naru	Watt E. D.	Canarese	S. India	*Agave americana*
Bulbil	Baker and others	English	...	...
Butt	...	Do.	...	Agaveæ spp.
Cabuja	Martius, also Dodge	Spanish	Antilles	*Furcraea gigantea*
Cabulla (1)	Dodge	Do.	Central America (Costa Rica)	*Furcraea tuberosa*
Cabulla (2)	Squier	Do.	Central America (Yucatan)	*Agave sisalana*
Cabuya	Seemann (Voyage of the Herald, Botany, p. 216.)	Do.	Central America (Panama)	*Fourcroya tuberosa* Ait.
Cajete	Martius	Do.	Central America (Mexico)	*Agave americana*
Cajun	Dodge	Do.	Central America	*Furcraea cubensis*

Page	Remarks
96, 105, &c.	Kattale = *Aloe*, &c. Nar = *Fibre*.
81	A young plant sprouting from a flower shoot in the place of a seed vessel on the flowering stem or 'scape' of certain *Agaveae*. All the species dealt with in this Bulletin are believed to produce bulbils, notably (D), (E), (G), (H), (J) to (K) we have no certain information.
	The (usually thickened) base or stalk of the leaf in *Euagave* and *Furcraea*.
94, 95	Variously spelled as *Cabouya*, and *Cabuya*—(origin unknown, but perhaps provincial Spanish); often regarded by Spanish writers as = *Agave americana*. Apparently first mentioned by *Oviedo* ('Cabuya') as an inhabitant of the West Indian Islands. Martius, (in the '*Beitrag*') hesitated between '*F. gigantea*' and *F. cubensis*; in the Flora Brasiliensis he gives *F. tuberosa* for the *Cabuya* of the islands and the mainland equally. Dodge says the *Cabuya* is *F. gigantea*, and that *F. tuberosa* is '*Cabulla*': for *F. cubensis* he gives other names. See *Cabuya, Hayti Hemp, Mauritius Hemp*, &c., and the next also.
105, 129	Dodge notes that samples from Costa Rica resembled Sisal fibre (*i.e.*, our G). The origin of the name is not known, but Piso remarks of his *Caraguata guacu* usually identified with *Furcraea tuberosa* Ait. that its 'root' is like an onion. This *Furcraea* is apparently unknown, so far, in India. See the next item, also *Caraguata guacu*.
88, 89, 99, 105, 109, 117, 128, 135, 139, 142, 147	Squier says expressly that this name is applied to the fibre of *Yashqui* and of *Sacqui* which he speaks of as 'varieties' of '*A. sisalana*.' (= G of this Bulletin). Perhaps the Costa Rica fibre mentioned by Dodge was really fine 'Sisal,' but Squier may have been misinformed; Piso notes that from his *Caraguata guacu* a very fine fibre suitable for 'hammock-cloth' was made: we suspect that statements which ascribe the finer kinds of '*pita*' to the *Agaveae* are often erroneous, and that the fine sorts of thread are more commonly derived from different little known *Bromeliaceæ*.
129	*Furcraea tuberosa* Ait. Found on the volcano of Chiriqui. Seemann says the fibre of the leaves is very strong and used for making ropes and hammocks.
105, &c.	The basin which is scooped in the centre of the leaves of certain *Agaves* (*A. atrovirens*, Karw. also *A. cochlearis* Baker, &c., according to Rose) to collect the sap for fermenting 'Pulque.' The liquor is drawn off daily with a long gourd (acojote) and the face of the basin (cara) scraped to promote a fresh flow of the liquor.
94, 95	Wight figures as *F. gigantea*, Vent. a *Furcraea* (Ic. 2025) which may be *F. cubensis*, Vent. (See *Mauritius Hemp*, &c.).

Name	Authority	Language	Where used	Scientific determination
Cantala (1)	Asiatic Researches VI. 230	Sanscrit	N. India	*Agave?*
Cantala (2)	Ainslie	Sanscrit	N. India	*Agave vivipara*
Canton Hemp	Martius	English	India, &c.	*Musa troglodytarum textoria*
Caragate	Moerman	French	Belgium	...
Caraguata (1)	Kew Bull. Sel. Papers Addl. Ser. II. Art. XXXVIII	Spanish	S. America (Paraguay)	*Bromelia argentina*, Baker
Caraguata (2)	Martius	Do.	Antilles	*Fourcroya cubensis*

Page	Remarks
130	The *Botanical Observations on Select Indian Plants* were interrupted by the death of Sir William Jones, and the List gives nothing further; but the plant was very likely our *Agave* (D), which has been known in Bengal for a considerable period, though the author's query shews that he was well aware that it could hardly have been there when Sanscrit was a living language. *Roxburgh*, who was better acquainted probably with Agave (E), which is naturalized in Coromandel, fitted the name Cantala to that. See the next, *Kantala* and *Kuntala*, also *Kantal*, &c.
130	When Buchanan brought Agave (J) to notice it appears to have been regarded in Bengal as a var/ of Roxburgh's *A. Cantala*, but the name assigned by Buchanan to his plant gradually superseded Roxburgh's as regards this supposed variety. Meanwhile the Sanscrit epithet was transferred to the 'variety' (which Roxburgh probably had never seen) from the *A. Cantala* of Roxburgh, and finally, when his *Cantala* was lost from the Calcutta Garden, *Agave* (E) was confounded with the altogether different *Agave* of Wight (J), so that '*Agave vivipara*' of Wight (which is doubtless that of Buchanan and Ainslie) has been very commonly supposed to be the Indian *Cantala*. Whether Cantala had ultimately anything to do with *Agave* is a different matter, as to which see *Kantal* and *Kathal*.
...	From the botanical identification this should be = *Musa textilis*, but *Agaves* also are reported to have been cultivated on the Chinese Coast, as a supplement, most probably, to the true Manila fibre.
97	'Or Spanish Barb—another species of vegetable hair.' *Tillandsias* yielding '*Crin vegetal*' are no doubt intended. See *Agave palo*,— and *Barba de palo*. A common Spanish American name is 'Barba de Vello' where 'Barba' = 'rootlets'—'fibre.' Cf. the following.
93	'*Caraguata*,' which is variously rendered as *Caroata*, *Cravata*, *Grawatha*, also, perhaps, *Curratow*, *Coratoe* or *Keratto*, *Karata* and *Karatas*, is a comprehensive term applied from the coasts and islands of the Caribbean Sea to the Argentine to different species of *Bromeliaceæ*, belonging chiefly to the genera *Bromelia*, *Karatas*, *Tillandsia*, with perhaps *Billbergia* and *Aechmea* also. In Columbia, and adjoining States it seems to be used for one or more *Furcraeas*. The *botanical* genus *Caraguata* is not known, at present, to include any economic species. The Paraguay *Caraguata* was exhibited at Paris in 1889, and was ascertained at Kew to be derived from a then undescribed *Bromelia*. There are at least two kinds of southern *Caraguata*, viz.:—*Caraguata de agua*, and *Caragata ibera*, one of which remains to be identified. See *Ibera*, also *Istle*, *Mexican fibre*, *Silk grass*, *Curratow* and *Keratto*.
94, 95	It is not clear whether Martius regarded *Caraguata* as the Carib name of *F. cubensis* (or F. *cubensis* and F. *tuberosa*) as distinguished from F. *gigantea* ('pita'), but the home of the *Furcraeas* was more likely on the mainland, near the Isthmus, though they may have spread to Cuba first and thence back to the mainland from the eastern *Antilles*.

Name	Authority	Language	Where used	Scientific determination
Caraguata (I)	Piso De Ind. Utr. Re. Nat. etc. Amst. 1658	Spanish	S. America (Brazil, etc.)	Bromelia Pinguin, Linn.
Ditto (II)	Do.	Do.	Ditto	Furcraea tuberosa, Ait.
Ditto (III)	Do.	Do.	Ditto	Aloe Sp.
Ditto (IV)	Do.	Do.	Ditto	Bromeliacea?
Ditto (V)	Do.	Do.	Ditto	Karatas Sp.
Caraguata Acanga	Do.	Do.	Ditto	Bromelia Pinguin, Linn.
Caraguata Guacu	Do. (Also Marcgraf acc. to Martius).	Do.	Ditto	Furcraea tuberosa, Ait.
Carata	Martius	Carib	West Indian Islands	*Agaveae* and *Bromeliaceae*
Caratas	Labat (in Martius)	French	Antilles	*Furcraea cubensis*
Caraua	Dodge	Brazilian (Lingoa geral)	Brazil	*Bromelia* Sp.
Cardon	Gomara	Spanish	Central America	Agave Spp.

Page	Remarks
98, 108, 117	See *Caraguata acanga.*
98, 117	See *Caraguata guacu.*
98, 108	Usually identified with *Aloe vera* L.; however that may be, it is *not* a *Furcraea* or *Euagave.*
98, 108, 117	Perhaps a *Billbergia* or allied *Bromeliacea,* but at all events neither a *Euagave* nor a *Furcraea.*
98, 108, 117	Manifestly a '*Nidularium*' from S. America and by the description of the fruit *Karatas Plumieri,* E. Morren. This is not impossibly the *Caraguata de agua* of Kew Sel. papers XXXVIII [see *Caraguata* (1)].
98, 108, 118	Rightly identified by Sloane with the common Penguin of the West Indian Islands. There has been hopeless confusion with regard to these *Bromeliaceæ,* with the result that this *caraguata* has been credited with fibre: it produces a fruit, eaten in the Islands and in parts of S. America, but the fibre is reported to be worthless. The *Bromelia acanga* of Linnæus (according to the Index Kewensis) was partly *Bromelia Pinguin* of the Sp. Pl. and partly *Karatas Plumieri,* E. Morren. See *Caroata.*
98, 117, 118	See *Cabulla* (1). This *Furcraea* is not naturalized or used so far in India; we have not recognized it even in gardens. As a fibre producer it is believed to have some advantages over the other *Furcraeas.* (See *Mauritius Hemp*). The name is probably the *Caroata assu* of the Tupi dialects in Spanish dress.
97, 98, 108	Martius identifies the plant of Marcgraf with *F. cubensis,* but see *Caroata assu.* He considers that this was the original Carib name for sundry *Agaveae* and *Bromeliaceae* and that Carib war-canoes took the plants and their names to the mainland of S. America. The *Furcraeas* may have come to the Orinoco delta from the Eastern Antilles, but they were probably brought to the Islands by the agency of man from the Peninsula or Isthmus previously.
97, 98, 108, 125	Cf. *Bois de Méche.* Possibly two names are involved, one referring to a *Furcraea,* the other to a *Bromeliad.*
98, 108	See *Caroa.*
110	Meaning 'Thistle' or 'Artichoke' and referring to the prickly nature of certain *Euagaves*; applied to plants of the *Cactus* kind also.

Name	Authority	Language	Where used	Scientific determination
Caroa ...	Martius	Tupi Indian	Brazil	*Billbergia variegata*, Schult.
Caroata	Martius	Tupi Indian	Brazil	*Bromelia karatas*
Caroata Assu	Do.	Do.	Do.	*Fourcroya gigantea* and *F. cubensis*
Carow	Purchas (in Sloane)	Brazilian?	Brazil?	*Aloe Yuccae foliis*
Catecomer	Garcia	Malayalam	South and Western India	Aloe Sp.
Catevala	Rheede Hort. Malab. XI. t. 3.	Do.	S. India	Do.
Cauthaulay	Madras Exh. Cat., 1855	Canarese	S. India (Mysore)	Aloe Sp.
Cebar	Garcia	Arabic	Turkey, Persia, etc.	Aloe Spp.
Cebu Hemp	Dodge	English	Philippines	*Musa textilis*
Century Plant	Squier (and others)	Do.	North America (U. S. A.)	*Agave americana*
Chaparay	Martius	Chayma Indian	S. America (Orinoco Delta)	*Agave americana*
Chauga nara	Madras Exh. Cat., 1857	Telegu	S. India (Rajahmundry)	*Sanseviera Zeylanica*

Page	Remarks
98	Cf. *Caraguata* (1) also *Caraguata* IV (of Piso). The plant of the younger Schultes is identified with *B. speciosa* of Thunberg.
98, 108	*Bromelia Karatas* (see Index Kewensis) is *Karatas Plumieri*, E. Morren, a pineapple-like plant of the Caribean region, reported to yield strong but soft fibre. See, however, the preceding, *Ibera, Istle, Mexican fibre, Silk-grass*, etc., also *Caraguata* (1), and *Carow*.
94, 95, 98, 108, 117.	This appears to be the *Caraguata guacu* of Marcgraf (see above), but Piso's plant is evidently neither of the *Furcraeas* named, but *F. tuberosa*, Ait. Confusion may have arisen over DeLaet's *Nequametl*: Martius identifies the Tobago plant as *F. cubensis*, and no doubt correctly: but Marcgraf's *Caraguata guacu* was Brazilian.
98, 116	Sloane has included two sets of names, if not more, under his *Aloe Yuccæ foliis*; one series evidently refers to the fibre-yielding *Bromeliaceae*, another to the *Sisal* group of *Euagave*, or to *Furcraea*. The "*Carow*" of Purchas' traveller was perhaps the same as *Caroa* and referable to *Billbergia* or *Karatas*.
113	Spelled *Catecomor* by Linschotten and Bauhin. The first part is perhaps the same as that of the *Kadanaku* or *Catevala* of Rheede and may represent a 'Persian' form (Kadi or Kazi) given to local names derived from Kanta (thorn):—for the second part cf. *Kunwar* etc.
113	From 'Kantewala' (*i.e.*, thorny) ? See also *Kadanaku*.
113	Doubtless a rendering of *Kattale*. See *Country aloes*.
113	Cf. *Acebar*, and *Azul*, also *Sabar*, etc.
...	From *Cebu*, one of the Philippine group of Islands.
99, 111	Given to the garden kinds of *Agave* from a tradition started by Borel that the species first introduced into Europe flowered when the life of the plant attained a hundred years, and not earlier.
96	Martius compares this with *Azul Champahra* (q.v.). *Chapara* in Spanish means a kind of Oak, but the true oaks (in Panama at least) seem to be called *Cerro*.
77	Cf. *Saganara*, and *Sauga*.

Name	Authority	Language	Where used	Scientific determination
Chelem	Perrine, also Schott (in Engelmann)	Maya Indian	Central America (Yucatan)	**Agave** Sp.
China grass (1)	Roxburgh	English	East Indie	*Sanseviera Zeylanica*
China grass (2)	Watt E.D.	Ditto	Cosmopolitan	*Boehmeria nivea*, Hook. and Arn.
Chinguirito	Jackson	Spanish	Central America (Mexico)	*Agave americana*
Chini Kalabanda	Ainslie Mat. Med. ii. 160	Telegu	S. India	*Aloe littoralis*, Koenig
Chom	Dodge	Maya Indian	Central America (Yucatan)	*Bromelia Pinguin*
Chota Kanwar Ka Patta	Ditto	Hindustani	Central Ind (Deccan)	*Aloe littoralis*, Koenig
Chouca	Ditto	Spanish	Antilles	*Agave v vipara*
Chucumci	Engelmann	Maya Indian	Central America (Yucatan)	*Agave rigida* Mill.—*var.*
Chucau	DeLaet (in Sloane)	Peruvian	S. America (Peru)	*Aloe secunda*, &c.

Page	Remarks
145	According to Engelmann, Perrine and Schott described under this name a wild *Euagave* of Yucatan which they supposed (or were informed) was the wild original of *Yashqui* and *Sacqui* (q.v.)= *Agave sisalana*, Perrine, and *Agave longifolia*, Engelmann, of this Bulletin. There is no sufficient evidence at present that either of these plants exists in a wild state in Yucatan or elsewhere; but it is just possible that Perrine referred to the Euagave known as *A. decipiens*, Baker (K of this Bulletin). When the text was written we were not aware that Dr. Perrine had introduced several distinct kinds of *Euagave* from Yucatan into Florida. *Agave ixtlioides* of Bot. Mag. is near Baker's *A. decipiens*, and was supposed in the same way to resemble *Agave Ixtle* of *Karwinski* from Yucatan which was credited with 'Ixtle' fibre. See also *Ixtle, Silk Hemp, Silk grass* and *Ixtli.*
77	Roxburgh conjectured that the China grass of his time, used for fishing lines, &c., was obtained from this plant. As Sir George Watt has already pointed out, we do not really know what the modern *China grass* is produced from, or whether it is always got from the same species; but the *China grass* of present commerce is ascribed to species of *Boehmeria* (of the Nettle family, Nat. Ord. *Urticaceae*) see *Canton Hemp* also *Bowstring Hemp* (1).
...	The *Rhea, Ramie, Ortie blanche*, &c.
96 &c.	Brandy made from the sugarcane (molasses presumably) as distinguished from *Agave* spirit, *Aguardiente de maguay*, which see, also *Aguardiente.*
113	In Malayalam *Chenna Nayakam.* Cf. *Kadanaku* also *Jeeni kattalai.*
145	Cf. *Chucumci.*
113	From the earlier accounts of Western India both the *Aloe* and *Agave* seem to have been called 'Kanwar,' *i.e.*, 'thorny,' the *Aloe* being the lesser, the *Agave* the greater *Kanwar* respectively.
121, 127	This looks like a French rendering of some Spanish or Carib name. Whatever the plant may be it is not so far identified with Agave (J) of this Bulletin = Wight's A. vivipara: but it is perhaps the plant mentioned by Martius (Beitrag, p. 10) as figured by Oviedo in his supplementary Ms.
83 to 146	Not identified; reported by Schott as yielding a coarse fibre. Cf. *Chom.*
85	Identified by De Laet with 'the Maguey of the Mexicans':—the *Aloe secunda* of Sloane is *A. americana* of Linnæus.

NAME	Authority	Language	Where used	Scientific determination
CHULULQUI	Martius	Maya Indian	Central America (Yucatan)	*Fourcroya cubensis*
COCUY	Squier	Spanish	Central and S. America (Venezuela and New Grenada)	Agaveæ Sp.
COCUYZA	Do.	Do.	Ditto	Ditto
COGOLLO	Martius (also Rose)	Do.	Central America (Mexico)	*Agave sp.*
COMETICO	Nelson	Do.	Ditto	*Do.*
COQUISE	Martius	Do.	S. America (Columbia)	*Agaveæ Spp.*
CORATOE	Martius (quoting Long's Jamaica)	English	Jamaica	*Fourcroya cubensis*
CORATTO	Patrick Browne	Do.	Jamaica	*Agave americana*
CORAZON	Martius, also Dodge Rose and others	Do.	Central America (Mexico)	Agave Spp.
COUNTRY ALOE FIBRE	Madr. Exh. Cat., 1857	Do.	Central India (Hyderabad)	*Agave sp.*
COUNTRY ALOES (1)	Madras Exh. Cat., 1855	Do.	S. India (Mysore)	Aloe Sp.?
COUNTRY ALOES (2)	Do., 1857	Do.	Ditto	Ditto

Page	Remarks
98, 117, 145, 146	It is not clear what Martius supposed his *chululqui* to be; he refers the fibre of Yucatan to several species, such as *Furcraea cubensis*, *F. tuberosa*, *Agave Jacquiniana*, *A lurida*, *A. Ixtle*. At present the only species known to yield *Sisal Hemp* are *A. sisalana*, Perrine, and *A. longifolia*, Engelmann.
110	See *Maguay de Cocuy*.
110	Ditto, and Cf. *Coquise*.
...	The central cone of leaves in certain *Agaves*:—in the species that yield 'Tampico fibre,' the 'cogollo' is removed from the living plant to be treated for fibre.
...	A Mexican beverage made from certain species of *Agave*.
110, 117	Meaning not traced. Cf. *Cocuyza*.
117, 124	See the next, also *Great American Aloes*.
117, 124	Browne supposed his plant to be the same as the *A. americana* of writers on Mexico, but Martius referred it to *Fourcroya cubensis*, which the description will not suit, we think. He lays stress on its detergent properties. See *Keratto*, also *Caraguata* (1).
9	The 'heart' or central cone of the Pulque-yielding *Euagaves* at poling time, which is removed to make the cavity for sap collection (*Cajete*).
96	This item is one in a long list headed '*Agave* sp.,' which, however, also includes '*Aloe perfoliata* ropes,' &c. Under Part I we have not mentioned the true aloe as a source of fibre, because evidence of its present use is wanting. Cf. the next, and *Country aloes* (2).
96	As the same local list (for Mysore) contains *Long Aloe* (*A. vivipara*) and *Short Aloe* (*A. americana*), and 'cauthaulay' is given as the equivalent, the '*Country aloes*' fibre should have been from a true aloe, but *Kattali* is now the name at Bangalore of an *Agave*.
96	('Or *Cuthala nar*'.) If this was the same fibre as the *Country aloes* of 1855, it may have been from an *Aloe*; Royle supposed that it was from an *Agave* and the experiments have been quoted for *Agave americana* by subsequent writers. There seems no doubt that cordage has been made in S. India with fibre from the true *Aloe*, but not recently at least on a commercial scale.

Name	Authority	Language	Where used	Scientific determination
Coztic Meti	Hernandez	Aztec	Central America (Mexico)	Agave Sp.?
Cravata	Martius	Brazilian	S. America (Brazil)	*Agaveæ* and *Bromeliaceæ*, Spp.
Cravata de Rede	Do.	Ditto	Ditto	*Bromeliaceæ* ?
Crowia	Morris	Indian dialect	S. America (British Guiana)	*Ananas sativa*, Linn.
Cuba Hemp	Guilfoyle	English	Australia	*Furcroea gigantea*
Cumari	Rheede	Brahmin language	S. India	*Aloe* Sp.
Curaca	Patrick Browne (also Sloane)	Spanish	Jamaica	*Agave* Sp.
Curratow	Spon	Brazilian	S. America (Brazil)	*Bromelia Sagenaria*
Cuthala Nar	Mad. Exh. Cat., 1857	Canarese	S. India (Mysore)	...
Cuttalay	Royle	Tamil	S. India	Agave Sp.
Cutthalay Nar	Do.	Canarese	...	Do.
Dagger Plant	Dr. Bidie (1877)	English	S. India	*Yucca gloriosa*
Elephant Agave	Government Botanist Madras	Do.	S. India (Tinnevelly)	Agave Vera Cruz, Mill.

Page	Remarks
103	Martius suggests *Agave americana*, but the description hardly fits any *Fourcroya*. Perhaps a *Manfreda*. Also given as *Maconte Metl* and *Metl Coztli*.
98	See *Caraguata* (1).
93	Meaning 'Net' or 'Hammock' *Carouta*. See also *Curratow* and Cf. *Reda aonas* of India.
98, 154	In Thorn ascribed the *Krowa* or *Crowia* fibre to a *Bromelia*, but the plant at Kew has been identified by Sir Daniel Morris as the pine apple. The word is presumably the same as *Caroa*. Also spelled *Krowa*. Cf. *Caroa*.
94, 95	More than one species of *Furcraea* seems to have been tried in Australia, and one kind at least is grown on a considerable scale in Queensland. From the name this should be the *Furcraea cubensis* of Ventenat, but we do not know what the species of *Furcraea* really are that are grown or used in any of the countries interested.
113	A Sanscrit epithet (referring to the goddess *Durga*) applied to the true *Aloe*. See also *Caterala*.
124	= *Coratto*. See also *Keratto*.
98	The scientific name appears to be taken from *Arruda da Camara* whose plant is said by Martius to be called *Cravata de Rede* (*Ananas bracteatus* of the younger Schultes). Also called *Gravatha* according to Spon. Cf. also *Caraguata* (1).
98	This was one of a series of ropes received at the Madras Exhibition of 1857 of which the breaking weights were carefully tested by the Arsenal Staffs at Bangalore or at Madras, and the result elaborately recorded, but without avail, as it is impossible to say what the plants were that supplied the fibre. See *Country Aloes* (1) and (2), *Pooty Mungem*, &c.
98	i.e. *Kattale*; which is properly = true *Aloe*. Cf. *Kattali*.
...	*Nar* = 'fibre' in several of the S. Indian languages apparently. Cf. *Cuthala Nar*, and *Kattali*.
78	Also called 'Spanish Dagger,' 'Spanish Bayonet,' etc., in different countries.
88, 89, 147	(D) of Bulletin. Probably a translation of *Anai Kattale*.

Name	Authority	Language	Where used	Scientific determination
Enequen	Purchas (in Sloane)	Carib	America	Agave or Furcraea Sp.
Enuga Kala-bantha	Government Botanist Madras	Telegu	S. India (Gantur)	Agave Vera Cruz, Mill.
Enuga Kala-bonda	Ditto	Do.	S. India (Kistna, Nellore)	Ditto
Enuga Kala-bunda	Ditto	Do.	S. India (Kistna, Nellore, Kurnool)	Ditto
Erikatali	Watt E. D.	Canarese?	S. India (Bellary)	*Agave vivipara*
Espadillo	Booth in Kew Sel. Papers (Add. Ser. II) LXIV	Spanish	Central America	Agave Spp. ?
False Sisal	Kew Sel. Papers (Add. Ser. II) LIX	English	N. America (Florida and Bahamas)	Agave decipiens, Baker.
Fayal Lace	Dodge	Do.	N. America, etc.	*Agave americana*
Filo de pita	Liotard	Portuguese	Portugal	*Agave americana*
Fily Agulha	De Lecluse	Spanish	Spain (Valencia)	*Aloe americana*

Page	Remarks
97, 117	See *Henequen* and *Sisal Hemp.*
83, 86, 147	(D) of Bulletin. *Cf. Yenuga Kalabanda, etc.*
83, 86, 147	Ditto Ditto Ditto.
83, 86, 147	Ditto Ditto Ditto.
131	Probably Agave (J) *i.e.*, our *A. Wightii.*
93	Mr. Booth notes that the Brush fibre exported through Matamoras may be from the *Palma loca* (See *Palma*) or from various forms of the *Espadillo.* We do not know to what plants *Espadillo* is applied, but it is perhaps a version of the Mexican '*Ixtle*' [see *Ixtle* (3) and *Mexican fibre* (1)] and applied in part to one or more *Euagaves.*
77, 82, 83, 92, 106, 141 to 143, 146	This is probably one of the Yucatan *Euagaves* of which local (Maya) names are given by *Perrine, Schott* and *Martius,* and may be their 'Chelem' or 'Wild Henequen'. It may further be the *Agave ixtlioides* of *Karwinski* and the *A: rigida* (wrongly so named) of Engelmann (not of Miller). It has run wild in Florida, and was imported by mistake as *Sisal* to the Bahamas. Known only in Botanic Gardens in India. It is not in good repute as a fibre-yielder, but it can readily be distinguished.
96, &c.	A valuable kind of lace, formerly prepared in Fayal (Azores group) with thread prepared from the fibre of an *Agavea,* perhaps *A. americana,* Linn. or *A. Vera Cruz,* Miller. The comparative abundance of one or more Agaves in the Atlantic Islands (including St. Helena) is remarkable, but their introduction is due probably to human agency, though the bulbils are believed to survive immersion in sea-water.
96	This term is said to stand in Spanish also for the fibre of '*Agave americana.*'
111, 114, 126	See *Aloe americana.* The plant of which De Lecluse took an offset from Valencia to Antwerp was very likely our D=*Agave Vera Cruz,* Mill., but that which the Dutch introduced to N. Europe (from the West Indies, or by way of the Far East) is different, being *A. americana* of Bot. Mag. 3654 and, earlier, of Linnaeus. The Valentian name means '*thread and needle.*' Cf. 'Eve's thread'=*Yucca filamentosa; Adam's Needle* (above); and 'Anana de Agulha' applied in S. America to the fibre-yielding *Ananas bracteatus,* Schult. In the Spice Islands the Dutch settlers called an *Agave* 'Naeldendraet' which had probably a like signification.

Name	Authority	Language	Where used	Scientific determination
Fique	Dodge	Spanish	S. America (Ecuador)	*Furcraea gigantea*
Ghaipat	Liotard	Hindustani (Deccani)	S. W. India (Ahmednagar)	*Yucca gloriosa*
Ghaymari	Do.	Ditto	S. W. India (Ratnagiri)	*Agave vivipara*
Ghee Koomar	Roxburgh	Bengali	N. India (Bengal)	*Aloe* Spp.
Ghi Kunvar	* Pharmacographia Ind.	Hindustani	S. W. India	*Aloe vera*, Linn.
Ghikwar	Stewart Panjab Plants, p. 232	Panjabi	India (Panjab)	*Aloe perfoliata*
Ghrita Kumari	Asiatic Researches, XI —156	Sanscrit	N. India	Aloe spp.
Giant fibre lily	Guilfoyle	English	Australia	*Furcraea gigantea*
Grass Hemp	Ditto	Ditto	Ditto	*Agave rigida*
Grass silk	Hakluyt's Voyages (in Sloane)	Ditto	America (probably New Grenada)	*Aloe Yuccae foliis*
Gratte Gratteuse	Kew Sel. papers (Add. Ser. II) LXVI	French	Mauritius	...

Dymock, Ward, and Hooper Bombay 1889—1893.

Page	Remarks
94, 95	Dr. Ernst identified this with the *Cocuyza* of Cumana, and both with '*Furcraea gigantea.*'
78	Cf. (for the vern. name) *Bilati pat* and the following.
131	Probably Agave (J); but the local name looks like a corruption of the following.
113	See '*Ghrita Kumari.*'
113	To be distinguished from *Bara Kunvar*, etc., which are species of *Agave*. This is perhaps the original vernacular from which *Ghrita Kumari*, etc., have originated; for the second component see *Kunvari* if the first be a gloss also then compare *Kia*, etc.
113	Also called *Kwar Gandal*, 'gandal' being 'bulb,' and 'kwar'= 'kanvar.'
113	This appears (see *Pharmacographia Indica* p. 468, for origin and other forms) to be based on an older name of some plant, indigenous or anciently established, in Western and North-Western India e.g., *Aloe indica* of Royle. If the true *Aloe* has been introduced on the coasts of India, it evidently had arrived before the *Agaveae*.
94-95	This reads like a book name, but is quoted as actually in use by more than one authority. It is not current in India. See *Mauritius Hemp* also.
146	Dr. Guilfoyle evidently meant *A. sisalana*, Perrine, = (G) of this Bulletin.
116	Under this Latin name Sloane has quoted several different plants, one of which may be *Agave sisalana*, Perrine: '*Grass silk*' or 'Silk of grass' (Hariot in Hakluyt) was perhaps a *Bromeliacea*: Sloane's own 'silk grass' is identified with *Henequen* and Hernandez' '*Pati.*' Among doubtful synonyms he cites Hariot with a query, also Fitch (in Hakluyt) who attributes a fine fibre to 'a grass which they call Yerva.' What 'they' in Fitch's day called 'Yerva' (*Erva babosa*) in the Brazils was *Aloe vera* Linn, but Fitch seems to have meant a product of '*Orixa,*' *i.e.* Orissa in the E. Indies (? *Sansevieria*). See *Silk Grass*, &c.
...	A machine for scutching the fibre of the Mauritius Hemp (*Furcraea* spp.).

Name	Authority	Language	Where used	Scientific determination
Gravata	Martius	'Lingoa Geral' (Brazil)	S. America	*Bromelia Karatas*
Grawatha	Spon	Do.	Ditto	*Bromelia Sagenaria*
Great Aloe	Balfour (Cyclopædia)	English	S. India	*Fourcroya gigantea*, Vent.
Great American Aloes (1)	Cleghorn (Forests and Gardens of S. India)	Do.	Ditto	*Agave americana*
Great American Aloes (2)	Long (in Martius)	Do.	Jamaica	*Fourcroya cubensis*, Haworth
Green Aloe	Liotard	Do.	S. India (Mysore)	*Agave vivipara*
Grey Aloe	*R.E. P.	English	India	Agave Vera Cruz, Mill.
Guamara	Dodge	Tupi Indian	S. America (Brazil)	*Karatas Plumieri*
Guapila	Rose	Mexican	Central America (N. Mexico)	*A. falcata*, Engelmann
Gul Shabo	R. E. P.	Persian	N. India (Patankot, Panjab)	A. Cantala, Roxb.
Hampe	...	French	France and French Colonies	...
Hane-a-Cane	Martius	English	America	Agave and Furcraea spp.

* Reporter on Economic Products to the Government of India.

Page	Remarks
93, 98	See *Caraguata* (1), *Caroata*, &c.
98	See *Curratow*.
96	See the next.
96, 124	We have not discovered what the Lesser American Aloe may have been in Europe, but the *distinction* dates back to the earliest days of *Agave* cultivation. Ventenat was probably contrasting his plant with *Furcraea tuberosa*, and one kind of the Mauritius Hemp may have been called the Great Aloe in contrast with another; but Cleghorn's use is that of most English horticulturists.
97, 98, 108, 117, 124, 121	For other 'English names,' see the preceding and the next; also *Country Aloes*, *Grey Aloe*, *Hedge Aloe*, *Hill Aloe*, *Long Aloe*, *Short Aloe*, *Wild Aloe*, *Seaside Aloe*, etc.
121	No doubt a *Furcraea* (see *Sime Kattale*). The Madras Exhibition Catalogue for 1855 includes fibre from Cuddapah ascribed to '*Agave viridis*.' There is no such species known to botanists, and the fibre probably was from one of the *Furcraeas*. The leaves of the Indian *Furcraeas* are usually of a lighter shade and brighter green than those of the *Euagaves*, and the name recalls the 'Aloes Vert' of the Mauritius—a term not in use in Europe, apparently, where '*Green Aloes*' since the days of Rauwolf's Travels (Book III, p. 315) has referred to a true *Aloe*.
83, etc.	Referring to the 'grey' or 'blue' (glaucous) tint that is usually conspicuous in (D) of this Bulletin.
93, 98	Cf. *Istle*. Dr. Ernst identifies the (Venezuelan?) product with this name as 'Bromelia Pinguin.' '*Guama*,' again, is from a totally different order of plants (*Lonchocarpus* Nat. Ord. *Leguminosae*).
...	Mr. Rose regards Engelmann's '*falcata*' as perhaps identical with *A. striata*, Baker, which is Mr. Booth's 'Palma loca.' See *Mexican fibre*, etc.
88, etc.	(E) of this Bulletin. Planted for hedging, and perhaps naturalized in the Kangra Valley and neighbourhood [See *Adam's Needle* (2) also]. Fibre is made from the leaves; and the 'poles'—like those of (D) in the Agra Province— are used for litters (note by Burkill). *Gulshabbo* (*i.e.*, 'Evening-perfumed-flower') is properly the Tuberose (*Polianthes tuberosa*, Linn.).
79	The 'pole' or scape, *i.e.*, flowering stem,—of *Agaveae*.
97	According to Martius a corruption of Henequen. We have not encountered it.

NAME	Authority	Language	Where used	Scientific determination
HATHI CHINGAR	Mukerji, also Watt E.D.	Hindustani	N. India (Oudh)	*Agave vivipara*
HATHI SENGAR	Watt E.D.	Ditto	India	*Agave americana*
HAYTI HEMP	Bernardin (in Dodge)	English	N. America ?	*Furcraea gigantea*
HEDGE ALOE (1)	Madras Exh. Cat. 1857	Do.	S. W. India (Poona)	Agave Sp. ?
HEDGE ALOE (2)	Cameron (Bangalore Cat.)	Do.	S. India (Mysore)	*Aloe barbadensis*, Mill.
HENECHEN	De Laet (in Sloane)	...	Antilles	*Aloe Yuccae foliis.*
HENEQUEN (1)	Oviedo (in Sloane)	...	Do.	Ditto
HENEQUEN (2)	Martius	Haitian	Antilles (San Domingo)	Agaveae spp.

Page	Remarks
131	*Hathi* = elephant; *Chingar* probably means a 'claw,' or 'thorn;'—Mukerji does not give the locality.
96	Cf. the preceding.
94, 95	From an article by Mons. M. F. Fasio at p. 342, Journ. d' Agriculture Tropicale, No. 41, 1904, it appears that in Algeria, where *Agave* is utilized on a commercial scale for fibre, the French experts are familiar with three 'Aloe-fibre' species, viz. (1) *A. americana* so called, which we believe to be our Agave (D), naturalized and planted in Algeria; (2) '*Sisal*' or '*Henequen*,' which should be our (G) or a closely allied species; (3) *Pite d' Haiti* which from Barnardin (quoted by Dodge) is '*Agave foetida*,' commonly identified with *Furcraea gigantea*, Ventenat, and the '*Mauritius Hemp*' (which see, also *Pite*, etc.). Mons. Fasio has recently exhibited in Paris (at the Musée Commercial de l' Office Colonial) a superior staple of the class of 'Hayti Hemp' (and 'Sisal') which he gets from a plant naturalized in Algeria, referred by him to *Agave* without further identification or description. This may be the second naturalized *Agave* of S. Spain and N. Africa which some authorities have referred to '*A. mexicana, Lamarck*; but that,—in so far as it is anything beyond a name,—was a *Furcraea*.
96	Possibly *Agave* (*D*).
96	C. G. Hope is quoted for the identification.
116	See the next.
Do.	Sloane cites *Oviedo* without question; also *Purchas' Voyages*. Martius will have it that Oviedo's *Henequen* was a *Furcraea*, and this may be so; but Sloane's *Aloe Yuccae foliis*, based on the Henequen of early English travellers on the mainland, was pretty certainly one of the Yucatan *Euagaves*, which, as cultivated for the fibre, have a very Yucca-like aspect. For other references by Sloane, see *Anana de Pite*, *Carow*, and *Grass silk*, also *Pati*.
97, 117	Martius supposes that the *Henequen* and *Pita* of the islands were derived mainly from species of *Furcræa*, and that some of these with the Haitian or the Carib names were transplanted to the mainland, where they extended to different other plants, some belonging probably to the *Bromeliaceae*. There is probably much truth in this as regards the northern shores of S. America, but in Yucatan the fibre industry came, according to tradition, from Mexico, and the native home of the Sisal group of Euagave is rather to be looked for on the Pacific slope of C. America. Mr. Dodge remarks that 'Nequen' was a native Mexican word; and the dominant races who maintained the cultivation of different *Euagaves* both for mead and cordage came from the N. West or South and not from the islands. Whatever may have been the ancient history of the word it is now applied in the chief markets to the *Yucatan* fibres, and to those of the *Sisal* group more particularly. See also *Sisal Hemp*, etc.

Name	Authority	Language	Where used	Scientific determination
Henequen (3)	Perrine	Maya Indian?	Central America (Yucatan)	**Agave sisalana**, Perrine, and connected species
Henequen (4)	Barnardin (in Dodge)	Spanish	Central America	*Yucca filamentosa*
Henequen Hemp	Guilfoyle	English	Australia	**Agave sisalana**, Perrine
Hennequen	Oviedo	Haitian	Antilles	**Agave** and **Furcraea** sp.
Hennequin	Perrine	Maya Indian	Central America (Yucatan)	**Agave sisalana**, Perrine
Hennequinitos	New York Exh. Report, 1853 (quoted by Squier)	Spanish	Do.	Do.
Hill Aloe	Ainslie, Mat. Med. 1813	English	India	**Agave Wightii** of this Bulletin
Huci Metl	Hernandez	Aztec	Central America (Mexico)	**Agave** sp.
Huila	Rose	Spanish	Central America (Mexico)	*Agave* sp.

Page	Remarks
89, 144, 145	In 1834 Dr. Perrine, U. S. Consul at Campeachy, submitted a report to his Government on the fibres of the Yucatan Peninsula, in which he described the '*Henequen*' as fibre made in Yucatan from different kinds of *Agaveae*, of which he selected the 'Yashqui hennequin' as the best for cultivation in his own country. In 1838 he introduced different species from the Peninsula of *Yucatan* to that of *Florida*, where his life was sacrificed during an incursion of the Indian tribes from the interior. Since his time '*Henequin*,' or, as it is now usually spelled, '*Henequen*' has become a fibre of first rate importance in several countries, and Perrine's selected species has been introduced successfully into Bengal and Mysore in India. It is said that other staples have been largely mixed at the ports of the Gulf of Mexico with that got from the *Euagaves*, but the term '*Henequen*' is still properly applicable to the best qualities of Yucatan *Euagave* fibre. (See also *Sisal Hemp*.) It must be remembered at the same time that the sort mostly grown in that Peninsula is not Perrine's '*Sisalana*,' though closely resembling it. For outside countries Perrine's is believed to be superior to it.
78	This is no doubt quite correct as regards some local usage. Under *Aloe Yuccae foliis* Sloane quotes Hermann and other authors who had intended either forms of Yucca, or of the small *Agaves* that have 'thready' leaf-margins, none of which have yet been tried on a market scale in India.
146	This seems to be well known and appreciated in parts of Australia.
109	Oviedo's actual spelling. See Henequen (2) for details.
146	So spelled, apparently, in Perrine's original report, which we have not seen, nor his articles in *Silliman's Journal*. We have followed Engelmann as regards the spelling in this case. Cf. *Henequen* (3), etc.
81	*Bulbils* or young plants developed on the parent branches in the place of seeds by a process of proliferous germination in *Euagave* and *Furcraea*.
91, 131	We include these and other terms, though the books are somewhat out of date, because they are not unlikely to recur locally in the course of business.
109	See *Coztic Metl*. (We have not been able to give more than a few of the names in Hernandez).
...	Cultivated near Bolanos in the state of Jalisco for fibre. Species not determined. Identified with the *Bastard Tequila* (which see also *Tequila*).

Name	Authority	Language	Where used	Scientific determination
Ibera	Kew Sel. Papers (Add. Ser. II), XXXVIII	Brazilian	S. America (Paraguay, etc.)	*Bromelia* sp.
Imbira branca	Martius	Tupi and other native Indian languages	S. America (Brazil, etc.)	*Funifera* sp.
Istale	Squier	Spanish	Central America (Mexico)	*Bromelia sylvestris*
Istle (1)	Do.	Do.	...	Ditto
Istle (2)	Temple in Journ. Soc. of Arts, Vol. V, p. 125	Mexican	Central America (British Honduras)	Ditto

Page	Remarks
93, 98	See *Caraguata* (1) and the following.
...	From the works of Humboldt and Martius it appears that several different kinds of fibre known in S. America under variations of the word *Embira*, e.g., *Imbira*, *Ibera*, and their compounds (e.g., *Macembira*) are obtained from species of *Ananas*, *Bromelia*, *Funifera* (Nat. Ord *Thymelaceæ*), *Lecythis* (N. O. *Myrtaceæ*), *Apeiba* (N. O. *Tiliaceæ*), and *Bombax* (N. O. *Malvaceæ*). These 'Embira' fibres are apt to be confused with each other and with those of the *Agaveae*. See also *Macembira*, and *Caraguata* (1).
93, 98	A patch of *Istle* cultivation, or *Pinuella* farm, so called in the country bordering on the Gulf of Campeachy (see the next and *Ixtle*).
93	Spon, under *Nidularium Karatas* (see *Ixtle*), following partly Squier, partly independent authorities, notes that a Bromeliad yields a good and cheap fibre called 'Ixtle' in Mexico. This has been called in question, but is certainly correct (see the next and *Ixtle*). 'Istle' is a simpler way of spelling '*Ixtle*,' where the 'x' is the Spanish equivalent for certain sounds of 's.' *Istle*, *Itzle*, *Ixtli*, *Ixtly*, *Ixtilli*, *Iztl*, *Ystle*, *Yztli* are apparently one word in various disguises, but unfortunately the same shape has come in cases to mean very different things, if not on the spot, at all events in markets and offices.
93	The plant which the Chief Justice of Honduras brought to notice so far back as 1857 was undoubtedly one of the *Bromeliaceæ*, and there is little doubt that it yields a long fine fibre of superior quality. Later evidence shows that this plant or another closely resembling it is found in abundance all along the sub-tropical coast belt from the Gulf of Campeachy to the Vera Cruz neighbourhood. What '*Bromelia sylvestris*' may be and what the *Istle* plant is (if there be only one species in the tract mentioned), we have no immediate knowledge; but Sir D. Morris' matured opinion points to the *Karatas Plumieri* of Morren—*Nidularium Karatas* of Lemaire (see the preceding, *Caraguata* (1) and connected references). This plant is identical, as we suppose, with a Bromeliad which is established in the Sibpur Garden and seems very much at home in its surroundings, but this is not known to have been raised on a commercial scale as yet in India. This staple would probably have taken better hold in the U. S. A. and in the English colonies but for a series of mistakes as to local names and geography. It has been confounded with the small *Agaves* of the '*Tampico fibre*' series [see *Ixtle* (3), *Tampico fibre*, etc.], though these are produced in a totally different part of Central America; also with the fibre *Exagaves* of the Yucatan Peninsula [see *Bromelia Pita*, *Silk Grass*, *Sisal Hemp*, etc.]; and, further, with the *Bromelia Pinguin* of Linné, ('Penguin' of the West Indies), which produces a fruit, but a very sorry fibre apparently [See *Caraguata* (1) of Piso]. The '*Pita Bromelia*' (*i.e.*, Honduras *Istle*) seems to be known in the local Spanish very generally as *Pinuella* (pronounced 'Pinyuella'). *Pina* (pinya) is the pine-apple; *Pinuella* represents one or more 'wild pineapples' or fibre-yielding Bromeliads.

NAME	Authority	Language	Where used	Scientific determination
ITZLE	Dodge	Mexican	Central or S. America	...
IXTILLI	...	...	Ditto	*Agave* sp.
IXTLE (1)	Squier	Mexican	C. America (Isthmus of Nicaragua, etc.)	*Bromelia sylvestris*
IXTLE (2)	Spon	Ditto	C. America (Mexico)	*Nidularium Karatas*
IXTLE (3)	Rose	Ditto	Ditto	Agave sp.
IXTLE MESCAL	Dodge	Ditto	Ditto	*Agave Wislizeni*
IXTLI (1)	...	Ditto	Central America (State of Vera Cruz)	Karatas Plumieri, Morr. ?
IXTLI (2)	Martius	Maya Indian ?	Central America (Yucatan).	*Agave Ixtle*, Karwinski

Page	Remarks
	= *Ixtle*?
83, 84, 101, 140, 141, 147	Evidently *Ixtle:* applied to an *Agave* said to be naturalized in Burma, if that be the same with one cultivated at Saharanpur in N.-W. India—Agave (A) of our list, which again is very like a form cultivated at Kew from the Turks or Caicos group of islands (in the Bahamas). When Parts I and II were written we were not aware that Perrine had introduced more than the one species of *Agave* into Florida, but it seems that he planted out several Euagaves,—all from Yucatan apparently (some were for experimental purposes most likely). This gives special interest to the plant illustrated in Miss Mulford's Plates 60 and 61 and an undetermined Agave from the Perrine grant (S. Florida), which is in all probability one of Perrine's imported Euagaves (see Dodge's Plate III). We have followed the American authorities in leaving this plant without name pending further information, but in the light of the above it evidently merits examination as a source of fibre. It is not unlikely that the *Agave Ixtli* of Karwinski from Yucatan received its specific name on the supposition that it was the fibre 'Istle' of the country; this, if not actually the same as Baker's *Agave decipiens* (the false Sisal), is very near to it, and may be the 'wild' kind of Engelmann. Perrine may, we think, have imported (among others possibly)—(i) *A. sisalana*=(G), (ii) *Agave* (A), and (iii) *A. decipiens*, Baker=(K); and if there is or was an Euagave known as *Ixtle* in the Maya country, our A and not Karwinski's plant perhaps represents it. How it has become naturalized in Burma remains to be discovered.
93, 98	Possibly in part the same as Temple's *Istle*, i.e., *Istle* (2). Major Barnard (U. S. A.) reported on it from the Isthmus of Tehuantepec (Gulf of Campeachy), but diverse products were perhaps included under the one name, at least one being probably an *Agave*.
93	See *Istle* (1), *Mexican fibre*, *Pita pinuella*, and *Silk grass*. Spon's contributor has unfortunately confused the *Istle* of S. E. Mexico and Nicaragua with that of the dry north (Zacatecas, Tula, Sinaloa, Coahuila, etc.), for which see the next and '*Tampico fibre*.'
93	The species of *Agave* which yield '*Tampico fibre*' (chiefly used in brush-making) belong for the most part to a different section of the genus from the *Euagaves*. None have been so far planted in any part of India except here and there in gardens. See also *Broom root*, *Brush fibre* (1) and (2), *Mexican fibre*, *Tampico fibre* and *Reju*.
98	This belongs to the *Euagave* section, but has nothing to do with the *Mescal* of the southern parts of Mexico. It is practically unknown in India.
93	A spelling (more correct perhaps) of *Ixtle*, which see, also *Istle* (1) and (2).
146	See *Ixtilli and Yxtli*.

Name	Authority	Language	Where used	Scientific determination
Ixtly	...	Aztec ?	Central America (Mexico)	...
Jafirabad Aloes	Pharmacog. Ind.	English	India	**Aloe**, sp.
Jamaica Keratto	J. G. Baker	Do.	England	*Agave Morrisii*, Baker
Jangli ananas	Balfour (Cyclopædia)	Hindustani	India (Bengal, &c.)	*Agave americana*
Jangli anás	Pharmacog. Ind.	Ditto	S.-W. India	Ditto
Jangli Kunvara	Watt E. D.	Ditto	India (Guzerat)	*Agave americana*, Linn.
Jeeni Kathalai	Govt. Botanist, Madras	Tamil	S. India (Salem)	**Agave Vera Cruz**, Mill.
Jenequen	Schott (in Engelmann)	Maya Indian (in Spanish form)	Central America (Yucatan)	*Agave* sp.
Jungli	Dodge	Bengali	India (Bengal)	*Agave americana*
Kadanaku	Rheede	Malayalam	S. India (Malabar coast)	**Aloe** sp.
Kadi	Forskohl, Fl. Aeg. Ar. p. 172.	Arabic	Arabia Felix (Yemen)	*Keura odorifera*
Kalabanda (1)	Pharmacog. Ind.	Telegu	S. India	*Aloe vera*, Linn.
Kalabanda (2)	Govt. Botanist, Madras	Tamil	S. India (Nellore, Cuddapah)	**Agave Vera Cruz**, Mill.
Kalabantha	Balfour (Cyclopædia)	Do.	S. India	*Agave americana*
Kalabonda	Govt. Botanist, Madras	Telegu	S. India (Anantapur, Nellore, Bellary)	**Agave Vera Cruz**, Mill.

Page	Remarks
...	A variation of *Ixtle*. See *Istle* (1) and *Yztli*.
113	A sort of bitter aloes made at *Jafirabad* in Guzerat by families claiming African descent.
91	From the description this Euagave would seem near to our *Agave* (*H*), but we think the Indian plant is allied rather to the '*Sisalana*' group, including (E) and (F), and a likely fibre-producer. See *Keratto* also.
96	Meaning 'wild pineapple.' We have not met with the expression.
96	Cf. the above, also *Nanas utan, Reda aonas*, etc.
96	Cf. *Bara Kanwar, Kunvar*, etc., also *Gritha Kumari*: the species may be (D) = *A. Vera Cruz*, Mill.
86, 147	From *Jin* (a demon)? but cf. *Chini Kalabunda*.
144	Another spelling of *Henequen*, which see. We do not know precisely what Schott meant by the term, not having his original report before us. Engelmann ascribes all the best Yucatan fibre to '*A rigida*, Miller,' and its supposed varieties, *sisalana* and *longifolia*, but Schott seems to have relied a good deal on local accounts, and his *Jenequen* may have included fibre from other sources. See *Sisal Hemp* also.
96	'Ananas' (or the like) has evidently dropped out in printing. See *Jungli ananas* above.
113	Sometimes spelled Kadenaku. The first two syllables are probably Kanda, or Kanta, 'a thorn.' See also *Catevala, Cumari, Kenda* and *Kunvar*. The Persian and Arabic *Kadhi* (Qazi) and *Kadi* (Cadi) are perhaps glosses on the first component of the Indian name.
95	Cf. the preceding, and *Keura*.
96	We have not been able to discover the meaning of this widespread name,—but see *Kalbanda* and *Klamanda*.
87, 147, &c.	Cf. the preceding. Many changes have been rung on the spelling.
96	= the preceding.
87, 147	No doubt a variant of *Kalabanda*.

Name	Authority	Language	Where used	Scientific determination
Kalabunda	Ainslie Mat. Med. 1813	Telegu	S. India	Aloe sp.
Kalabuntha	Liotard	...	S. India (Madras)	*Aloe perfoliata*
Kala Kantala	Balfour Cyclopœdia	Sanscrit	India	*Agave americana*
Kalbanda	Fallon (Dict.)	Hindi	India	*Aloe perfoliata?*
Kalkali	Do.	Hindi (Tirhut dialect)	N. India (Bengal)	Ditto
Kalnan	Dodge	...	India	*Agave* sp.
Kalnar	Liotard	Hindustani (Deccani)	India (Bombay)	Ditto
Kan	Dodge	Maya Indian	Central America (Yucatan)	*Agave rigida*
Kantala	Pharmacog. Ind.	Sanscrit	India	*Aloe vera, Linn.*
Kantal	...	Bengali	N. India (Bengal)	*Artocarpus integrifolia, Linn.*

Page	Remarks
113	It seems almost as if in Telegu *Kalabanda* were the true aloe; in Tamil the *Agave*.
113	The first fibre products from 'Kalabuntha' sent to Europe from Madras (by Dr. Hunter) were ascribed to a true aloe. Later *Agave* fibre was sent from the same quarter under the same name of *Kalabantha*.
96	Cf. *Kalabanda* and *Kuntala*.
96, 113	'Kal' in 'Hindi,' etc. '=evil,' 'bastard,' 'degenerate,' etc. 'Banda' in Hindustani=parasite or epiphyte (e.g. Loranthus). See also *Klamanda*, of which possibly *Kalabanda* may be a corruption.
96, 113	See the preceding.
...	Perhaps taken from the following.
...	Cf. *Kalbanda*, *Kalkali*, and see *Nxr*. Reported from the S. Mahratta country.
143	Evidently one of the *Euagaves* of Yucatan or a *Furcraea*.
113	An epithet of the true *Aloe* meaning '*thorny*.' Cf. *Catevala*, *Kadanaku*, etc., and see *Cantala*, *Kathal*, *Kuntala* and the following.
	See *Kathal*. This was also possibly a *Kantala*. The jack fruit is perhaps only introduced in N. India, but very anciently. The pronunciation and spelling vary: this has both the vowels fairly broad (accented).

Name	Authority	Language	Where used	Scientific determination
Kantala (1)	Stewart (Panjab Plants, p. 232)	Panjabi?	Panjab?	*Agave Kuntala*, Roxb.
Kantala (2)	Watt E.D.	Sanscrit	India	*Agave vivipara*, Linn.
Kantala (3)	Prain (Vegetation of Hughli-Howrah, and 24-Parganas)	Bengali	Bengal	*Agave Vera Cruz*, Mill.
Karao	Moerman, (The Ramie etc.)	Japanese	Japan	*Boehmeria* sp.
Karaoata	De Laet (in Sloane)	Carib?	Antilles	*Ananas sylvestris Brasiliana*, Herm.?
Karata	Du Tertre (in Sloane)	French	Do.	Ditto
Karata Sauvage	Do.	Do.	Do.	*Aloë Yuccae foliis*

Page	Remarks
130	This native name is not current in N.-W. India so far as we know, and was taken possibly from Roxburgh, whose specific name is wrongly quoted. Roxburgh's own spelling of it varied; in the Hort. Beng. it is *A. Cantala:* in the Flora Indica *A. Cantula.* We have followed the former for our (E), of which we have seen no Panjab examples except from the Kangra Valley and neighbourhood. Mr. Burkill, however, has observed it in the Satlaj basin from Suket to below Simla.
100, 127 133, 136	Under Part II it has been explained why we do not follow Wight in identifying his plant with the *A. vivipara* of Linnaeus. As regards 'Kantala,' Linnaeus most certainly never saw *Agave* (J) (*i.e., Wight's* vivipara), nor probably did Roxburgh, and Roxburgh's species, which is our (E), is altogether different. In his first accounts (which give a high place to the fibre), Roxburgh wrote of it as a new species. Later he seems to have referred it to '*A. americana.*' Ultimately it was published as *A. Cantala.* Whether it was the *Kantala* of the *Asiatic Researches* is doubtful. Voigt and Colebrooke very possibly supposed that Wight's plant was a native—and the original *Kantala,* but the plant which Roxburgh identified with Rumpf's illustration is our *Agave* (*E*) and not Wight's *vivipara.* From an economic point of view the distinction is material, for the leaf of (J) has been found to be too short for fibre extraction on a commercial scale, whereas fibre prepared from (E) ranks in the market. The *A. vivipara* of Baker in the *Gardener's Chronicle* is by description *A. vivipara* of Wight not of Linné but plants now in cultivation at Kew ticketed *A. vivipara* belong to *A. Cantala* Roxb.
86, 88	Our (D) = *A. Vera Cruz,* Mill. '*A. lurida*' of the Sibpur Garden (*not* of Gawler and others) may have been the plant identified by the Pandits who assisted Sir William Jones and his contemporaries in their endeavours to identify plants mentioned in the Hindu Classics and Pharmacopœia; but we do not think it is the fibre plant on which Roxburgh reported, which was, we consider, Agave (E), i.e., *A. Cantala,* Roxb.
...	Cf. *Carao, Carow,* and *Caraguata* (1).
98	Sloane goes on to identify this with the Jamaica *Penguin.* Hermann's plant was very likely the 'Bromelia sylvestris' of later authors; but if it yielded fibre would more likely be *Karatas Plumieri,* Morren, than *Bromelia Pinguin,* Linn. See *Bromelia pita, Caraguata-acanga* and *Caraguata* (1), also *Istle* (1) and (2) and *Silk grass* for the confusion under this set of names of *Bromeliaceous* fibre plants with *Furcræa* and *Agave.*
113, 117	'A fruit,' and therefore no doubt rightly identified by Sloane with the Jamaica 'Penguins.'
113, 117	A 'pite' without prickles which Sloane thought might be Hernandez' *Pati* and Oviedo's *Henequen* (i.e., a *Furcraea* or a *Sisal Agave*) See *Pite* also.

Name	Authority	Language	Where used	Scientific determination
Karoon Kuttalay Nar	Madras Exh. Cat. 1857	Tamil	S. India (Madras)	*Agave* sp.
Karun Kathali	Govt. Botanist Madras	Do.	S. India (Dindigul)	Agave Vera Cruz, Mill.
Karun Kattalai	Do.	Do.	S. India (Coimbatore, Tinnevelly)	Ditto
Katar	Fallon (Dict.)	Panjabi	Panjab	*Artocarpus integrifolia*
Kathal	Do.	Hindi	N. India	Ditto
Kathalai	Watt E.D.	Tamil	S. India	*Agave americana*, Linn.
Kathalay	Balfour (Cyclopædia)	Do.	Do.	*Agave vivipara*, Linn.
Kathali	Govt. Botanist Madras	Do.	S. India (Cuddapah, Dindigul)	Agave Vera Cruz, Mill.
Kattal	...	...	...	...
Kattala	Govt. Botanist Madras	Telegu	S. India (Bellary)	Agave Vera Cruz, Mill.
Kattalay	Ainslie Med. Mat. (1816). —1-10.	Tamil	S. India	*Aloe perfoliata*, Linn.
Kattali	Cameron (Bangalore Cat.)	Canarese	S. India (Mysore)	*Agave americana*, Mill.

Page	Remarks
95, 113	Exhibited in 1855 from the same district, but source of fibre not named. Cf. the next.
86, 147	=*Agave* (D).
86, 147	= Do.
...	See *Kathal.*
...	Pronounced in Bengal with the last vowel broad (See *Bengal Plants*, p. 971). This has many forms, *e.g.*, Kathail, Kathair, Kath and *Katar*. See also *Kantal*. The allusion is of course to the spine of the Jack fruit. Fibre is said to be got in Burma and N. India from the bark of *Artocarpus* spp. (See also *Trap-tree.*) The Malayan name from which 'Jack fruit' is derived is applied also to the Pineapple (*Kapa-jakka*), while from old works on India it would seem that the 'Jakka or 'Yucca' of Malabar was an *Aloe* or even possibly an *Agave*. '*Kantala*' was perhaps originally an epithet of *Artocarpus integrifolia*, Linn., which must have been known long before any *Agave* had reached India. The difference of the 't' in the two words does not involve any radical distinction, and the current use of *Kantal* is for *Artocarpus*.
96	Usually in combination with a qualifying term, such as 'Anai,' etc. Cf. *Kattali*, etc.
96	Cf. *Cathaulay, Country aloe* (1) and (2) and *Kattali*, but also *Kattalay*.
86, 147	Cf. *Kathali, Kattala, Anai Kattalai*, etc.
...	See *Kathal.*
86, 147	Cf. *Kathali* and see also *Kantala* and *Kathal.*
113	Cf. the next, also *Kathalay, Kathali*, etc.
96	Mr. Cameron gives the Carnatic name for 'Aloe litoralis' as *Lolisaragida.*

Name	Authority	Language	Where used	Scientific determination
Kattali fibre	Madras Exh. Cat. 1855	English	S. India (S. Arcot)	*Agave* sp.
Kattaly	Do., 1857	Canarese ?	S. India (Madura)	*Agave* sp.
Kea	Roxburgh (Hort. Beng.)	Bengali	Bengal	*Pandanus odoratissimus* R.
Kea Kanta	Do.	Do.	Do.	*Pandanus foetidus* R.
Kenda	Watt E.D.	Hindustani	Do.	*Pandanus odoratissimus*, Willd
Keratto	...	Spanish	W. Indies	**Agave** sp.
Ketaki	Fallon (Dict.)	Pali	S. India	*Pandanus odoratissimus*
Ketgi (1)	Do.	Hindi	India	Ditto
Ketgi (2)	Watt E.D.	Do.	Central India (Deccan)	*Agave americana*, Linn.
Ketki (1)	Fallon (Dict.)	Do.	India	*Pandanus odoratissimus*
Ketki (2)	R. E. P., Govt. of India.	Do.	Central India (Berar)	**Agave Wightii** (of this Bulletin)
Ketki (3)	Liotard	Guzerati	Western India (Kathiawar)	*Pandanus odoratissimus*
Ketukee	Roxb. (Hort. Beng.)	'Sanscrit'	India	Ditto
Keura	Do.	Bengali	Bengal	Ditto
Keurkanta	Do.	Hindustani	Do.	Ditto
Khetki	Watt E. D.	Do.	N. India (Oudh)	*Agave vivipara*, Linn.
Kikanora Matha.	Govt Botanist Madras.	Telegu	S. India	**Agave Vera Cruz**, Mill.

* An unpublished coloured drawing however made under the supervision of Buchanan (afterwards Hamilton) and now preserved at Kew, gives *Ketkei* as a vernacular name for a plant which is unmistakeably A. *Cantala*, Roxb.

Page	Remarks
95, 113	Cf. *Kathalay, Kathali, Kattalay,* etc.
95, 113	Do. Do.
...	Cf. *Ketaki, Keura, Kia, Koyan,* etc., and the next. Dodge spells this '*Keya.*' Called '*Kekel,*' '*Keker*' in Malaya.
...	For other names and scientific designations see Bengal Plants, p. 1101. Species of *Pandanus* are native in different parts of India, but those usually found in hedges or near temples in Bengal were probably imported from Malaya.
...	See *Palkande.* Probably a dialectic form of *Kanta.*
117, 128	Originally *Caraguata* (which see) but in Jamaica and other West Indian Islands now commonly applied to species of *Agave* and *Furcraea.*
...	Cf. the next, *Ketki, Ketukee*—and *Ketgi.*
...	Cf. the preceding and following.
96	See the next also, and *Banskeora.*
...	Cf. *Ketaki,* etc
...	In the drier parts of India *Agave Wightii* (J) has made itself at home, and has acquired fairly constant local names, such as *Ketki* and *Banskeora.**
...	Fibre of leaves proposed as a paper stock; identification doubtful, possibly an *Agave.*
...	= *Ketaki.*
...	Cf. *Banskeora*; also *Mellis kyre,* etc. : *Keura* is the ordinary N.-W. Indian name for *Pandanus.* Forskohl (See *Kadi*) notes that a plant which was evidently a Pandanus was grown in S. W. *Arabia* in his day and called Keura by the 'Banians' (*i.e.*, Hindu traders).
...	See *Bengal Plants,* 1101, where '*Keorkanta*' (Bengali) is given for *P. foetidus,* Roxb.
91	Probably (J) brought from the Deccan and planted about forts and settlements by the *Rohillas,* as in the *Ganges Doab.*
86, 147	'*Matta,*' '*Motta*' or '*Matha*' is frequent in the names of *Agaves* in S. India (from Mata=Devi?); for '*Kanora,*' cf. *Kanur, Kunvar;*— and for the first syllable *kea, ghikomar,* etc.

NAME	Authority	Language	Where used	Scientific determination
KITHALI NARA MATHA	Govt. Botanist Madras	Telegu	S. India (Ganjam)	**Agave Cantala**, Roxb.
KITHANARA	Do.	...	S. India (Godavari)	Ditto
KITKI	Stewart (Panjab Plants, p. 232)	Hindi ?	Panjab	*A. Cantala*, Roxb.
KITTA NAR	Madras Exh. Cat. 1857	Telegu	S. India (Rajahmundry)	*Agave* sp.
KITTANARA	Balfour (Cyclopædia)	Tamil	S. India	*Agave Cantala* Roxb.
KITTANARA MATTALU	Govt. Botanist Madras	Telegu	S. India (Godavari)	**Agave Vera Cruz**, Mill.
KITTAULEE NAR	Madras Exh. Cat. 1857	Tamil	S. India (Vizianagram)	*Agave* sp.
KLAMANDA	Do.	Canarese ?	Do.	Do.
KOOMAREE	...	Hindi	India	**Aloe** spp.
KOYAN	Mukerji (Descr. Cat. Ind. Prod. Amsterdam etc., 1883)	Bengali	Bengal	*Agave americana*
KUNTALA	Roxburgh (Hort. Beng.)	Sanscrit	India	**Agave Cantala**, Roxb.
KUNWAR	Ainslie	Deccani	Central and Western India	*Aloe* sp.
KUTTALAY	Ainslie Mat. Med. (1826), ii. 160	Tamil	S. India, Madras	Do.

Page	Remarks
87, 147	Cf. the preceding, but 'Nara' is here perhaps 'fibre'.
87, 147	Cf. *Anakyitha*.
100, etc.	Stewart cites 'A. vivipara Royle' as a synonym, by which he meant possibly A. vivipara of *Wight* = (J): but from a coloured drawing made under the auspices of Buchanan (afterwards Hamilton) preserved at Kew it appears that the plant known to Buchanan as '*Ketki*' was A. *Cantala*. Roxb.
147	Cf. the next, also *Kithanara*.
147	This is probably correct: Cf. *Kithanara*.
	Cf. *Kithanara*, etc.
86, 147	The catalogue attributes this fibre (sent by H. H. the Raja of Vizianagram) to an *Agave*, but it may have been taken from *Sansevieria*. The original Coromandel *Kithanara* was most likely A. *Cantala*, Roxb. which is more like a screwpine in the leaf than the other Indian species.
86, 147	Cf. *Munda* and *Kalamanda*, also *Kalabanda*.
113	See '*Cumari*'. The correct transliteration is *Kumari*.
96	Probably from the local name of *Pandanus fascicularis*, Lam. (Bengal Plants, p. 1101).
129, 130, 136	Cf. *Kantala* and *Cantala*.
113	In Guzerati 'Kuvara' or 'Kumara'.
...	Cf. *Bara Kanwar*, *Catecomer*, etc.
113	Cf. Catevala (under *Catecomer*), *Cauthaulay*, *Kattali*, *Kathalay*, etc. Ainslie puts the accent on the second vowel, and says that *Kuttalay* is 'Aloe perfoliata' (Mysore, etc.) 'Aloe littoralis' being properly '*Sirooghoo Kuttalay*'. See *Small Aloe* also.

Name	Authority	Language	Where used	Scientific determination
Kutthalai	Brown and Wood	Tamil	S. India, Madras	*Aloe* sp.
Kuar Gandal	Stewart (Panjab Plants, p. 232)	Panjabi	Panjab	*Aloe indica*, Royle
Kyre	Ainslie	Deccani	S. India	*Agave vivipara*, Linn.
Laffa	Et. de Flacourt (in Sloane)	French	Madagascar	*Aloe Yuccae foliis* ?
Lal Murga	Piddington (Index)	Bengali	Bengal	**Celosia cristata**, Linn.
Langue Boeuf	Dodge	French	Antilles	*Furcraea cubensis*
Large aloe fibre	Mad. Exh. Cat. 1855	English	S. India (Tinnevelly)	*Agave sp.*
Lecheguilla	Miss. Garden Rept., 1896 (also Dodge, Rose and others)	Spanish	Central America (Mexico)	**Agave** spp.
Lida Boaya	Rumpf	Malay	Moluccas, &c.	**Aloe** sp.
Lily fibre	Indian Agriculturist, Dec. 12, 1891	English	England	*Agave americana*

Page	Remarks
113	When used without any qualifying addition this seems generally to refer to *Aloe* and not *Agave;* but see *Kattali.*
113	Means "Thorn—onion:" the first part is = *Kunwar,* &c., above.
95	'Kyre,' probably is from *Keora,* or *Keura,* usually in N. India given to Pandanus. Perhaps this word is the same as 'coir' and means simply 'fibre.' Old writers speak of a 'Quera' as yielding fibre near the Portuguese factories. Ainslie attributes his 'kyre' which was a 'strong and useful cordage' to an *Agave,* most likely (J) of this Bulletin. See also *Mellis Kyre* and *Kadi.*
77	This looks like one of the African names of *Sansevieria* (at Angola Ifé = *S. cylindrica,* Bojer) with the French definite article prefixed. Flacourt was Governor of Madagascar in the 17th century, and in Bojer's time *S. cylindrica* was cultivated in the Ile de France as a native of Zanzibar. See also *Anana de pite, Bowstring Hemp* and *Pitte Ahetz.*
...	Spon states that a valuable fibre is obtained from a *Celosia* in India, but, as Sir George Watt observes, 'confirmation of this fact is much required.' *Celosia cristata,* Linn. is cultivated in Bengal as an ornamental plant. *Celosia argentea,* Linn. is an abundant weed with autumn crops throughout N. India. Spon's authority may have been misled by a vernacular name. Cf. *Murga, Moorva,* &c. *Lal Murga* evidently means 'Red Cockscomb.'
94, 95	See *Cabuya, Henequen* (1) and (2), *Mauritius Hemp,* &c.
95, 96	Probably (D).
99	Applied in Northern Mexico and parts of Arizona, Texas, &c., to the 'cabbage' *Agaves,* several of which yield a short stapled fibre (see *Tampico fibre*), and are otherwise of economic interest. Most of these belong to the *Littaea* section of *Agave,* a section quite distinct from *Euagave* to which the *Sisal* group is referable. None are grown at present in India, except here and there in gardens, but in the drier provinces they would probably succeed as a source of *Brush fibre.* Dr. Treleasq informs us that Lecheguilla means 'lettuce.'
113	'Crocodile's tongue,' as distinguished from '*Nana boaya*' (crocodile pineapple) which we take to be *Agave Cantala* Roxb. = (E) or a very closely allied species. Blanco gives 'Lidang boaya' as a name of *Aloe* in the Philippines.
99	The article quoted states that this is a white lustrous and superior kind of fibre used in brush making, which is obtained from *Agave americana* in Mexico, and might be abundantly produced in India; but see *Aloe fibre, Mexican fibre* (1), and *Tampico fibre.*

Name	Authority	Language	Where used	Scientific determination
Long Aloe (1)	Rice (Mysore Gazetteer)	English	S. India (Mysore)	Agave sp.
Long Aloe (2)	Madras Exh. Cat. 1855	Do.	Ditto	*Agave vivipara*
Macembira	Martius	Tupi Indian	S. America (Brazil, &c.)	*Bromelia laciniosa*, Mart.
Macoztic Metl	Hernandez	Aztec	Central America (Mexico)	Agave sp.
Madre Pulque	Martius (and others)	Spanish	Ditto	Agave atrovirens, *Karwinskii* and other species
Magay	Edwards	Filipino	Philippines	Agave sp.
Maguay	H. B. K.	~~Do.~~ Spanish	~~Ditto~~ Central America	*Agave americana*
Maguay de Cocuy	H. B. K.	Spanish	S. America (Venezuela)	*Yucca acaulis*, H. B. K.
Maguay de Cocuyza	Do.	Do.	Ditto	Ditto
Mague	Edwards	Filipino	Philippines	Agave spp.
Maguei	Jacquin (Sel. St. Amer.)	Spanish	Cuba	*Agave cubensis*
Magueis	Hakluyt	Do.	Central America (Mexico)	Agave spp.

Page	Remarks
131	Probably Agave (J) *i.e.*, our *A Wightii* (See the next and *Short Aloe*).
131	Ditto ditto ditto.
98	Martius says Maca='hammock' and Embira='string'. *Bromelia laciniosa*, Mart. is believed to be=*Karatas Plumieri* Morren, for which see *Istle* (1) and (2).
109	See *Coztic Metl.*
140	The thickened dregs of the sap of the *Pulque Agaves* left in the 'cajete' or cavity of the plant,—added to the sap after it has been drawn off to promote fermentation.
99	=*Maguey.*
99	Humboldt in his own writings has noted clearly that the *Maguey* he saw in Mexico was planted or cultivated, and that there were several kinds, not belonging to the genus *Agave* exclusively. Kunth in dealing with the botany of Humboldt's travels described only one *Agave* which he referred (erroneously as appears from the works of Rose and others) to the *A. americana* of Linnæus (See also *Pulque, Tequila,* &c.) and stated that this occurred throughout Central America as far N. as Florida. The native place of *A. americana* Linn., is not known, but it seems doubtful if it is found except in gardens even in Mexico. See also *Maguey.*
98	So called at *Caraccas* (at that time) and used for fibre.
98	At *Cumana*, and used similarly. Cf. *Coquise.*
99	This is a provincial spelling in the Philippines. Other versions in the same Islands are *Amaguey* (which see), ~~*Maguis*~~, *Maguey*, and *Magui*. The plant or the fibre is called also in some parts '*pita*.' Cf. also *Magui.*
94, 95	*Maguei* appears in Hernandez both for the cider 'Metl,' and for a species which does not seem to be a fibre *Agave.* Jacquin says his Maguei is common in Cuba and used as a detergent. It is a *Furcraea.*
109, 110	The Maguey is so called by early English travellers. Cf. *Magueyes* (2).

Name	Authority.	Language	Where used	Scientific determination
Maguey (1)	Oviedo	Spanish	Antilles	*Agave vivipara*
Maguey (2)	Do.	Do.	S. America	*Agave americana*
Maguey (3)	Peter Martyr (in Martius, also in Danielli)	Haitian	Antilles (Haití)	Agave sp. ?
Maguey (4)	Squier	Spanish	Central America (Mexico)	*Agave mexicana*
Maguey Blando	Dodge	Do.	Ditto	*Agave Salmiana*
Maguey Cimarron	Schiede (in Linnaea)	Do.	Ditto	*Agave americana*
Maguey de Tequila	Dodge	Do.	Ditto	Ditto
Maguey Manso	C. Beni (in Danielli)	Do.	Ditto	*Agave Maximilianea* P. & I. Blasquez.
Maguey Manso fino	Dodge	Do.	Central America (District of Mexico)	*Agave americana*
Magueyes (1)	Oviedo	Spanish	Central or S. America	

Page	Remarks
121	Martius says that there is a drawing with the supplement of *Oviedo* which shows as the original *Maguey* a smaller plant than either *A. americana* or *Furcraea cubensis*, and suggests that it may have been *Agave vivipara*, but by this he did not mean perhaps *Agave Wightii* (J) of this Bulletin.
99	Oviedo quoted by *Martius* (Beitrag, p. 10) says that on the mainland in the country of *Araya* there is a nation on whose lands the Maguey is so abundant that they are called 'Magueyes.' The allusion is perhaps to the Maya plantations. From a recent work on Costa Rica reviewed in *Nature* No. 1846, dated 16th March 1905, it appears that parts of the Isthmus were held in the 16th century by a civilized race called *Mangue*.
109	The first mention of Maguey is by this author who says the ancient inhabitants of Haiti had a sort of drum or cymbal which was called Maguey. Martius thinks that these drums may have been made from the scape of an *Agavea*.
125	Squier rightly distinguished the Pulque Agave from the so-called '*A. americana*,' but *Agave mexicana* of Lamarck is a misnomer, and the *Agave mexicana* of Moore (in Gardener's Chronicle) is more probably Agave (F) as to which see '*Tequila*'. Bates (in Stanford's Compendium) also calls the Maguey *A. americana* and supposes that there is only one species throughout the 'Tierra Templada' from Zapotlan eastwards.
85, 147	*A. Salmiana*, Otto, is commonly identified with *A. atrovirens* Karwinski, which is said to be one of the chief Pulque Agaves in the State of Mexico. A large *Agave* is met with in gardens on the Continent of Europe under the name of *A. Salmiana*. Our Agave (C) appears to be near this species.
129	Meaning 'Wild Maguey.' Travellers have frequently reported finding '*Agave americana*' wild, but truly wild examples of Linnæus' *A. americana*, of the Pulque Agaves, and of *A. sisalana*, if they exist, remain to be discovered.
95, 96	See *Tequila*.
150 (footnote)	See *Maguey mansofino*. Beni says the scientific name is 'Agave Massimilianaea.'
95, 96	Meaning 'fine cultivated Maguey,' to distinguish a plantation kind from spontaneous hedge *Agaves*. It is unlikely that the term is restricted to the one species. A Mexican writer professes to have distinguished over 16 sorts in the Apam tract alone which is the princial Pulque-making area. He must have taken count of very fine distinctions, but even so the statement is significant.
.....	An Indian tribe of Central America in the 16th century 'named from the Agave.' See *Maguey* (2), but cf. the next also.

Name	Authority	Language	Where used	Scientific determination
Magueyes (2)	Zurita (in Martius)	Spanish	Central America (Mexico)	...
Magui	M. Blanco (Flora de Filipines, s.v. Agave)	Filipino	Philippines	*Agave americana*
Magweiz	Hakluyt, etc.	Spanish	Central America (Mexico)	Agave spp.
Malai Kathalai	Govt. Botanist Madras	Tamil	S. India (S. Arcot)	Agave Vera Cruz, Mill.
Malai Kattalai	Ditto	Do.	S. India (Tanjore)	Ditto.
Malay Kuttalay Nar	Ainslie	Do.	S. India	*Agave vivipara*, Linn.
Malino	Coulter	Spanish?	Hawaii	*Furcraea* spp.
Manchi Kalabunda	Govt. Botanist Madras	Telegu	S. India (Cuddapah)	Agave Vera Cruz, Mill.
Manguai	~~Ditto~~	Spanish	America	Agave spp.
Manguei	Linschotten (in K. Bauhin)	Do.	Do.	Ditto
Mangurie	Pedro Ordonnez (in Sloane)	Spanish	America	*Aloe secunda?*
Manila	Kew Sel. Papers (Add l. Ser. II), LXVI	English	Turks Islands	*Furcraea cubensis*
Manila Aloe Fibre	Kew Sel. Papers (Add l. Ser. II), LXII	Do.	Philippines	*Agave vivipara* L.
Manjie	Mad. Exh. Cat. 1857	Deccan	India (Hyderabad)	*Agave sp.*
Manjina Naru	Cameron (Bangalore Cat.)	Canarese	S. India (Mysore)	*Sanseviera Zeylanica*, Roscoe

Page	Remarks
...	Maguey farms or plantations were so called by the early Spanish invaders of Mexico.
96	Mr. Edwards notes that this form of the name survives locally. The common naturalized Agave in the Philippines proves to be *A. Cantala*, Roxb.
109, 110	Cf. *Magueis* and *Magueyes* (2).
86, 147	=Agave (D.). Meaning of 'Malai' not known.
86, 147	Ditto ditto.
95, 96	Perhaps Agave (J).
94, 95	Brought from America presumably.
86, 147	Agave (D). Cf. *Manjina Nar, Motta Munjee Nar*, etc.
99	A variant of *Maguey*.
99	Ditto.
116	As Sloane states that *Cabuja* was another name, the plant was doubtless a *Furcraea*.
...	See also Silk grass (4).
138	The naturalized Philippine species proves to be *A. Cantala*, Roxb.
...	Cf. the next and *Munjee Nar*.
77	(Misprint in the botanical name altered) Cf. *Motta Munjee Nar* and *Manchi Kalabanda*.

NAME	Authority	Language	Where used	Scientific determination
MAQUEY	Booth. in Kew Sel. Papers Addl. Ser. II. LXIV	Spanish	Central America	**Agave** spp.
MAROOL	Mad. Exh. Cat. 1857	Telegu (and Tamil)	S. India	*Sanseviera Zeylanica*
MARUL (1)	Watt E.D.	Hindustani	India	*Sanseviera Zeylanica*, Wild.
MARUL (2)	Govt. Botanist Madras	Tamil?	S. India (Tanjore)	**Agave Vera Cruz**, Mill.
MAST	Miss. Gard. Report 1896 etc.	English	N. America	**Agaveae** spp.
MAURITIUS HEMP	Kew Sel. Papers (Addl. Ser. II) LXV, LXVI	English	Cosmopolitan	**Furcraea** spp.
MAURVI	Asiatic Researches IV. 271	Sanscrit	India	*Aletris*, Linn.

Page	Remarks
...	A variant of *Maguey*. If this represents the actual sound, the original is possibly 'Ma-qui,' and the second syllable = *Qui*,—*Quil* (q.v.)
77	'Kattalay Nar' from Travancore at the same exhibition was apparently *Sansevieria*, in which case the same *local* name would cover *Aloe*, *Agave*, and *Sansevieria*; but perhaps there has been a mistake in ticketing.
77	This (Marul) is the correct transliteration.
87, 147	Cf. the preceding and *Marool* also.
80-82	Applied in the U. S. A. to the scape or 'pole' of *Euagave* and *Furcraea*.
94-95	It is usual to ascribe this commercial fibre to *Furcraea gigantea* Vent., but the plants grown in S. India do not always, or even ordinarily, answer to that species as defined by Mr. Baker. From the authority quoted by us it is clear that several species of *Agave* and *Furcraea*, to say nothing of *Sansevieria*, have run wild in the Mauritius, while the "Mauritius Hemp" that comes from St. Helena is not perhaps from a *Furcraea* at all, but from the St. Helena *Agave*, (*A. augustifolia* of the Buitenzorg Garden) which may be Agave (E) *i.e.*, *Roxburgh's Agave* = *A. Cantala* of this Bulletin. Wight's S. Indian *Furcraea* (see Part I, p. 12) and *Cajun* above, also the '*Agave viridis*' of Madras Exhibition Catalogues are perhaps *Furcraea cubensis* Ait. which is said to be the best fibre *Agavea* of the West India Islands. Different *Furcraeas* thrive throughout the moister parts of India, and the fibre is being brought into use in N. India also. Certain of the species tend like *Agave* (G.) (*Sisal*), and the Honduras Silk Grass plant [see *Istle* (1) and (2) and *Silk Grass*] to lose the side-thorns (prickles) of the leaf in cultivation. The true *Agave foetida* of Linnaeus grows in the Sibpur Garden, but we doubt its identity with the *Mauritius Hemp* plant of S. India. It seems to be common along the coasts of the Isthmus and the Orinoco region where it yields 'Cobblers thread.'—See *Aloes Vert*, *Cabuya*, *Hayti Hemp*, *Pite d'Haiti*, *Piet*, *Pita de Zapateros*, &c.
77	The *Sansevieria* fibre or Bowstring Hemp of Roxburgh (to be distinguished from the *Marsdenia* or *Jiti* bast, said to be the 'Muruvu Dul' of Ceylon). The name of the plant as distinguished from the fibre was 'Murva' which survives in the Bengali *Murva* or '*Moarba*' (Bengal Plants, p. 1054). Species of *Sansevieria* were at first referred to the genus *Aletris*.

Name	Authority	Language	Where used	Scientific determination
Maya	Squier	Cuban	Cuba	*Agaveae spp.*
Maypole	Hughes' Hist. Barbadoes (in Martius)	English	Antilles (Barbadoes)	*Furcraea cubensis*, Haw.
Mellis Kyre	Ainslie	Portuguese ?	India (Deccan)	*Agave vivipara*, Linn.
Mescal	Miss. Gard. Report 1896	Spanish	Central America (Mexico)	*Agave spp.*
Metl	Hernandez (and others)	Aztec	Central America	*Agaveae spp.* also *Bromeliaceae*
Metl Cotli	Hernandez	Do.	Central America (Mexico)	Agave sp.

Page	Remarks
128	Squier does not say which of the 'varieties' of *Henequen* or *Pita* is so called in Cuba; if it be a *Furcraea* then the reference is perhaps to the mainland opposite where the Maya Indians had their *Henequen* plantations. Great weight attaches to the view that '*Furcraea cubensis*' was taken to the Brazils from the Antilles, but more recent evidence points to the home of the *Furcraeas* being rather in Panama and the neighbourhood. In Venezuela the 'Maya' *fruit* is said to be a Bromelia (*Bromelia chrysantha*).
94-95	Probably one of the fibre yielding *Furcraeas*. Peter Martyr's text suggests that the Caribs worshipped one or other of the *Agaveae*, and a *Euagave* was deified in Mexico. Cf. *Mast* and *Pole* also.
110	Ainslie gives this also as *Mellis Cour* and says it is a smaller sort of cordage or twine than 'Kyre,' but from the same plant. The 'Kyre' or 'Cour' is probably the 'Queura' (Keura) of Garcia and other early writers, which seems to have been applied both to *Pandanus* and *Agave*. 'Mellore' was a Portuguese name for certain species of *Pandanus* including *P. Leram*, Jones; but the 'Mellis' in Ainslie may refer to the flowers of an *Agave*. The Maguey was called 'Honey Tree' and 'Melt,' a false analogy being drawn between 'Metl' and words meaning Honey in the Romance languages of Europe; the flowers, of the Island species particularly, distil honey. (Cf., however, *Agua de Miel*).
98	A spirit made from certain of the *Euagaves* that grow in the State of Mexico. It is called 'Mexical' or Mescal apparently to distinguish it from '*Tequila*,' and '*Mescal de Maguey*' as against *Aguardiente* and *Sotol* (which see, also ~~*Aguardiente* and~~ '*Tequila*').
110	A general name for sundry plants of Mexico (in the wider sense) mostly of the genus *Agave*—usually employed by the Mexicans themselves with a qualifying term to denote the sort intended. When the Spaniards arrived from the Islands they applied to the chief kinds, and particularly the Pulque-yielding species, the name of Maguey, which they had found given to plants of the same class in the Islands (e.g., *San Domingo*), and the early writers appropriated the names *Metl* and *Maguey* to a more or less apocryphal 'tree' which flourishes to the present day in various kinds of literature. *Acosta's* history has given rise to the statement that Maguey in Mexican means 'tree of wonders.' He did not say so, nor is 'Maguey' Mexican perhaps originally, but his '*Arbor de las Maravillas*' is a more or less imaginary plant gifted with the qualities of several different species.
109	See *Coztic Metl*.

Name	Authority	Language	Where used	Scientific determination
Mexcal Metl	Hernandez	Aztec	Central America (Mexico)	**Agave** sp.
Mexican Aloe	Spon	English	Europe	**Agave** spp.
Mexican Aloe Fibre	Mad. Exh. Cat. 185	English	South India	*Agave* sp.
Mexican Fibre	Dodge	Do.	N. America	*Agave heteracantha*
Mexican Fibre (1)	Booth in Kew Bulletin Sel. Papers (Addl. Ser. II) LXIV	Do.	Europe and America	**Agave** spp.
Mexican Fibre (2)	Spon	English	England	*Nidularium Karatas*

Page	Remarks
99	Hernandez' figure represents a small 'cabbage' Agave, rather like some of the ornamental kinds seen in gardens, but unknown in India; it seems near *Agave Shawii*, Engelmann, of California, but it may not be an *Euagave*. Its leaves were eaten by the natives as several species allied to *A. Shawii* are to this day by the Apaches; etc., who also prepare an intoxicating beverage from the Mescals of their country but by a different method from that of the South. Zuccarini identifies Hernandez' picture with his *A. heteracantha* (usually regarded as a chief source of *Tampico fibre*) but it looks like certain species since discovered in North Mexico.
96, 125	Given to the '*Agave americana*,' which has been supposed to yield so many economic products. (See *Maguey*, *Pulque*, &c.). About Mexico itself the local *Agaves* are chiefly valued for the sap, while the best fibres, those of Yucatan, come from altogether different species. The name perhaps originated with the '*Agave mexicana*' of the Encyclop. Meth. which is unmaintainable. See also *Pite d' Haiti* and *Tequila*. Mr. Gamble's '*A. mexicana*,' = (F) of this Bulletin, from North India is an altogether different thing from what Spon intended.
125	Also shown (from Madras) in 1857. See the preceding : several species no doubt contributed.
98, 99	Mr. Rose has shown recently that the botanical identity of the plants which yield this, also called (from places of export) 'Tampico fibre,' 'Matamoras fibre' &c., is as yet very doubtful. See the next also.
99	None of the *Agaves* that yield the Brush-making staple so largely exported from ports on the Gulf of Mexico are naturalized or grown on a commercial scale in India, and most of them belong to a different group from that which embraces the Pulque Agaves, with the Sisal Hemp and other long-stapled fibre plants of the order. Mr. Booth's account of the *Tampico fibre* is very clear as regards the trade from Northern Mexico where this class of fibre constitutes the local 'Istle' as contrasted with the *Istle* of the coast from Vera Cruz eastwards, which is from a different natural order. In India, however, good brush fibre has been taken from one or more of the naturalized *Euagaves*. (See *Aloe fibre* (3), *Mexican Whisk*, *Lily fibre* and *Reju*).
93	This is the *Bromelia pita* (for which see above) or '*Istle*' of certain parts of Central America, and altogether different from the preceding, as well as from the *Mexican Whisk* used in brush-making. It has been confused in America and elsewhere with '*Tampico fibre*'; also with the *Sisal Hemp* (See *Sisal Hemp*, *Istle*, *Ixtle* and *Silk Grass*), and in India with *Mexican Whisk*, which see, also the preceding.

l.c.
, and Broom

Name	Authority	Language	Where used	Scientific determination
Mexican Grass	Guilfoyle	English	Australia	*Agave sisalana*, Perrine (and allied species)
Mexican Hemp	Do.	Do.	Ditto	Ditto
Mexican Whisk	Kew Sel. Papers (Addl. Ser. II) LXXIX and LXXX	Do.	Europe and America	*Epicampes macroura*, Bth.
Mexocotl	Hernandez	Aztec	Central America (Mexico)	Bromeliaceæ Spp.
Mezcal (1)	Dodge	Mexican	Ditto	*Agave potatorum*, Zuccarini
Mezcal (2)	Jackson	Do.	Ditto	*Agave americana*
Mordha	R. E. P., Govt. of India	Bengali ?	Central India (Singhbum)	Agave Vera Cruz, Mill.
Motta Munjee Nar	Mad. Exh. Cat. 1855	Telegu ?	S. India (Madura)	*Agave* Sp.
Munda	Govt. Botanist Madras	Malayalam	S. India (Malabar)	Agave Wightii (of this Bulletin)
Munjee Nar	Mad. Exh. Cat. 1857	Canarese ?	S. India (Salem)	*Agave* Sp.
Muraga	Asiatic Researches, IV. 271	Hindi	India	*Aletris*, Linn.

Page	Remarks.
89, 147	Dr. Guilfoyle says that this name is given to the *Sisal Hemp* fibre (from species allied to *Agave sisalana*, Perrine). It is also mentioned by Dodge in his valuable '*Useful fibre Plants of the World.*'
89, 147	This is no doubt the 'Sisal' introduced into Australia, which we believe to be Agave (G) of this Bulletin. See *Sisal Hemp* also.
...	This has been confused in India with *Mexican fibre* (1) (which see) and with the fibre locally obtained for brush-making purposes from species of *Euagave* naturalized in India. The American product is used as a substitute for fibre obtained in Europe from different *Gramineae* (true grasses) some of which are believed to be abundant in the Himalaya also. In America brooms are made also from an *Aristida* closely allied to species that abound in India, *e.g.*, the 'broom sticks' of the Madras Presidency.
108	Probably *Bromelia Pinguin* Linn. Given with the different kinds of *Metl*, but *not* as a fibre plant.
...	Mr. Rose observes that the *Pulque* and *Mescal* Agaves are of different species in different parts of Mexico. We do not know whether *Agave* (D) is one of them and cannot therefore say whether any have been naturalized in India. See also *Mescal.*
96	A version of *Mescal.* See also *Mescal Metl* and the preceding.
86, 147	Agave (D). Perhaps from the Bengali *Murga*, which see.
95, 96	Cf. *Manchi Kalabunda, Manjee, Munjee Nar*, &c.
91, 147	= Agave (J). Cf. *Kalamanda.* In the *Pharmacographia Indica* it is noted that the true aloe is called *Mandala* because of the scimetar-like leaves.
96	Cf. *Manjee, Motta Munjee Nar*, &c. Doubtfully the same as the 'Fibre of Mungie Plant' shown from Mysore in 1855.
77	Usually now spelled 'Murga.' There are many variations, such as Murva, Murgabi, Murgahvee, Moorgalie, Murva, Murba, Moarba, etc., but all usually refer to the Bowstring Hemp of Roxburgh—a species of *Sansevieria.* (In Ceylon, however 'Muruvu-dul' is said to be the bast of *Marsdenia tenacissima* W. & A.) As a name of *Sansevieria* this has found its way to the West Indian Islands. See *Maurvi* and the next also.

Name	Authority	Language	Where used	Scientific determination
Murga (1)	Watt E. D.	Bengali	Bengal	*Agave americana*
Murga (2)	R. E. P. Government of India	Bengali	Central India (Singhbum)	Agave Vera Cruz, Mill.
Musambra	Pharmacographia Indica (III, 472)	Canarese	S. India	*Aloe* sp. [?]
Mutta Saga	Govt. Botanist Madras	Telegu?	S. India (Ganjam)	Agave Vera Cruz, Mill.
Mysore Aloes	Pharmacographia Indica (III, 472)	English	S. India	*Aloe* sp.
Nanas Boaya	Rumpf	Malay	Amboyna (Malay Archipelago)	Agave Cantala, Roxb.
Nanas utan	Do.	Do.	Java, &c.	*Agave* sp.
Nannas Sabrang	Hasskarl (in 'Flora' (II, 1842), p. 5).	Do.	Java (Sunda, &c.)	*Agave Rumphii*, Hasskarl
Nar	Ainslie	Tamil?	S. India	*Agave*, &c.
Nequametl (1)	Piso	...	S. America	Furcræa tuberosa, Ait.

Page	Remarks
95, 96	It is not quite clear whether the older authorities regarded '*Muraga*' or '*Murga*' as derived from *Murva*. The ordinary word for a gamecock is commonly derived through the Persian from the Arabic, but the wild bird is Indo-Malayan, and 'Murva' is given by some authors as a variant of 'Murgha,' so the word may be originally Indian. In N. India *Sansevieria* is as much an incomer as *Agave* (see Bengal Plants, 1054), and when *Murga* is applied in N. India to *Agave*, the allusion is plainly to the 'terrible spurs' as an American writer calls the spines of certain species. The habit of the leaves in *Sansevieria* may have earlier suggested a fanciful resemblance to the spur of a '*Bantam*.'
86, 147	See the last, and *Mordha*.
113	From the Arabic name of the true Aloe (see *Sabr*, etc.) and common term for the *drug* throughout India, but in S. India locally applied also to a 'size' or 'glue' used in house decoration, much as gilder's size is used in Europe; it seems possible that this is obtained from an *Agave*. See *Mysore Aloes* also.
86, 147	Cf. *Motta Munjee Nar, Sagi Mutta*, etc.
...	A species of the true Aloe is understood to be common in *Mysore*, but the gilder's cement or size called 'Musambra' and said to be got from '*Mysore Aloes*' may be from an *Agave*. See *Hedge Aloe* (2) however.
100	Meaning 'Alligator Pineapple.'
102, 114	Meaning 'Wild Pineapple.' From Rumpf's account it would seem that more than one Agave had reached the Indian seas by the middle of the 17th Century, for the merits of the fibre were even then disputed. See also the next and the preceding.
134	Meaning 'Foreign pineapple.' Hasskarl himself later identified this with our Agave (E.)=*A. Cantala* Roxb. (see his *Neuer Schlüssel* etc., 1866) and with the 'Nanas Costa' of Java mentioned by Miquel.
95	In several languages of S. India signifies 'cord,' 'thread,' or 'fibre.' In Hindustani it is a 'ligament' or 'sinew.'
94, 95, 129.	This is not Hernandez' *Nequametl* unless the figures have been misplaced by his editor: that looks like an *Agave* of the *Littaea* section, or, as Martius suggests, a *Dasylirion*.

Name	Authority	Language	Where used	Scientific determination
Nequametl (2)	DeLaet	...	Antilles (Tobago)	*Furcraea cubensis* (f. Martius).
Nipi	Blanco (Fl. de Filip.)	Filipino	Philippines	*Agave americana*
Nita	Balfour (Cyclopædia)	Tamil	S. India	*Agave americana, etc.*
Nulkyitha	Govt. Botanist Madras	Malayalam?	S. India (Malabar Dist.)	**Agave Wightii** (of this Bulletin)
Octli	Hernandez	Aztec	Central America (Mexico)	**Agave** Spp.
Ocpatli	Gomara (in Martius, etc)	Do.?	Ditto	...
Offset		English	...	...
Palkande	Dymock (Marathi Names, p. 5)	Marathi	S. W. India	*Agave* Sp.
Palma	Booth in Kew Sel. Papers (Addl. Ser. II.) LXIV	Spanish	Central America (Mexico)	*Agave* and *Yucca* Spp.
Panam Katrazhi	Watt E. D.	Malayalam	S. India	*Agave americana*
Parkand	Ditto	Marathi	S. W. India	Ditto
Patha	...	Panjabi	N.-W. India (Indus Valley)	**Nannorhops Ritchieana** Wendl.
Pati	Hernandez	..	Central America (Mexico?)	**Agave sisalana**, Perrine ?

Page	Remarks
94, 95	In editing Markgraf's work on the Brasils De Laet added *Nequametl* and a drawing of it as it grew in Tobago; this Jacquin has identified with his *Agave cubensis*, which is taken as = *Furcræa cubensis* of Ventenat.
96	This name is not in Edwards. Blanco says the outer leaves are smaller than in typical 'Americana,' meaning possibly *A. Cantala* Roxb.
96	Fibre of different *Agaveae*.
91, 147	Cf. *Ana Kyitha*.
97	Hernandez does not mention 'Pulque,' but gives *Octli* as the Mexican name, in his day, of the fermented liquor.
98	A herb which was mixed with the Agave mead to give it strength. Hernandez gives two different names for it. The practice continues, and it has been suggested, but probably without due ground, that the thorn apple (*Datura Stramonium*, Linn.) is employed.
81	A lateral shoot from the trunk or stock. In the Indian species of *Euagave* these are given off under ground, but the seedling develops at the surface.
95	Cf. *Parkand*. The 'Kand' is probably = 'Kanta,' a thorn. See *Kenda*, etc.
98	The earliest mention of the *Agaveae* in the Islands compares the *Maguey* to a palm, and the name is given in Tula, Zacatecas, and other tracts that supply Brush fibre, to different kinds of *Agave* and *Yucca*. Mr. Booth distinguishes the Palma loca, Palma real and Palma bareta. See *Mexican fibre*.
96	Cf. *Anaik Katrazhai*, etc.
96	Cf. *Palkande*.
...	See *Aloe* (2), *Pesh* and *Wild aloe*.
117	This does not seem to be either Spanish or Mexican, and no Aztec equivalent is given. The sketch suggests a *Furcraea*, or Agave (G) (the spineless form). It is called 'Metl lenissimum,' and is said to produce thread of the finest quality.

Name	Authority	Language	Where used	Scientific determination
Pedda Kala-banda Nara	Ainslie	Telegu	S. India	*Agave vivipara*
Peemai Katha-lai	Govt. Botanist Madras	Tamil	S. India (Salem)	Agave Sp.
Peetha Kala-banda	Ditto	Telegu	Ditto	Agave Vera Cruz, Mill.
Peetha Kala-bantha (1)	Drury (Useful Plants of India)	Ditto	S. India	*Agave vivipara*
Peetha Kala-bantha (2)	Brown and Wood	Ditto	Ditto	*Agave americana*
Pei Kathalai	Govt. Botanist Madras	Tamil	S. India (Madras, Tinnevelly)	Agave Vera Cruz, Mill.
Pemm	Dodge	Maya Indian	Central America (Yucatan)	*Ceiba pentandra*
Pemmanaw	Smith's 'Virginia' (Sloane)	...	N. America ?	*Aloe Yuccae foliis*
Penca	Blanco, &c.	Spanish	Mexico, Philippines, &c.	Agave Sp.
Pesh	Liotard	Beluchi	Beluchistan and Indus Valley border	Nannorhops Ritchieana, H. Wendl.
Petha Kala-bantha	Watt E. D.	Telegu	S. India (Bellary)	*Agave americana*, Linn.
Petre	Squier	Spanish	Central America (Guatemala) ?	*Yucca gloriosa*
Piante de cent anni	Danielli	Italian	Italy	*Agave americana*
Piet (1)	J. Commelin (Ed. Kiggelaar)	Dutch	Antilles	*Fourcroya foetida*
Piet (2)	Boerhaave	Do.	Ditto (Curacao)	Furcraea sp.

Page	Remarks
91, 92	Probably Agave (J).
83-84	We have not been able to determine the species, but this may be=Agave (A), the Burma species. (See *Ixtilli*).
86, 147	Cf. the following.
138	See *Pita* and *Kalabuntha*.
99	Probably Agave (D) is intended.
86, 147	Agave (D).
...	*Ceiba* belongs to a very different class of fibres from the *Agaveae* viz., the bast of the *Tiliaceae, Sterculiaceae*, etc., but see the next.
98	Possibly a *Yucca* or a *Manfreda*.
...	The outer leaves of *Euagave* as distinguished from the *Cogollo* or *Corazon*. Taken from the artichoke or thistle (cardon).
...	See *Aloe* (2), *Patha*, and *Wild aloe*.
96	Cf. *Peetha kalabanda*.
...	Dodge questions the identification.
96	i.e. *Century Plant*.
94, 95	~~'*Fourcroya foetida*' should be *Furcraea gigantea*, Vent.~~ Pre-Linnaean botanists knew this as '*Aloe Americana folio viridi, &c.*' and this is probably the origin of '*Aloes vert*' and the '*Agave viridis*' of S. Indian Catalogues. Through the French '*pite*.'
94, 95	Boerhaave says that the thread was used by shoemakers in Curacoa, and that the name was given to the plant from the fibre. Cf. also *Pita de zapateros*, and *Pit*.

NAME	Authority	Language.	Where used	Scientific determination
PINON	Squier	Spanish	Cuba	**Agave** or **Furcraea** sp.
PINUELLA	Do.	Do.	Central America (Panama, &c.)	*Bromelia sylvestris*
PIT	Hermann	Dutch	Antilles	**Furcraea**?
PITA (1)	Ditto	Spanish or Carib	Ditto	**Ditto**
PITA (2)	Martius	Carib	Ditto	**Agave** and **Furcraea** spp.
PITA (3)	Ditto	Portuguese	Portugal	*Agave americana*
PITA (4)	Dodge	Spanish	America	**Agaveae, Bromeliaceae,** and **Palmae** spp.
PITA (5)	Squier	Do.	Central America (Panama, &c.)	*Bromelia sylvestris*
PITA (6)	Kew Sel. Papers (Addl. Ser. II) XLVI	English	Turks Islands	*Agave rigida* var. *sisalana*
PITA BROMELIA	~~Ditto~~ Squier	~~Do.~~ Spanish	Central America (Honduras)	*Ditto*
PITA DE ZAPATEROS	Seemann, Botany, Voyage of the Herald, p. 21[illegible]	Spanish	Central America (Panama)	*Bromelia karatas*, Linn.

Page	Remarks
98	No doubt from 'Pina,' meaning 'wild pineapple.'
93, 98	'Pina' is the 'Pine apple;' Pinuella = *Karatas Plumieri*, Morr. probably. See *Pita* (3).
94, 95	Boerhaave (Hort. Ac. Lugd. Bat.) quotes Hermann's Par. Bat. Prodr. for *Pit*, *Pita*, as = an 'Aloe' (Agave). In the supplement to the Par. Bat. the spelling is 'Pitha' cf. *Piet*.
94, 95	Ditto ditto ditto.
97	Martius thinks *Pita* is the Carib equivalent of the Haitian *Henequen*, but leaves it in doubt to what species it was applicable. The Cabuja of the Spaniards was, he considers, a *Furcraea* and the Island *Maguey* was a comparatively small Agave (the '*Palms*' of Peter Martyr) used as a famine food (Oviedo). In another place he says '*Pita*' means 'pipe' (referring to the uses of tobacco in the W. Indies). Whatever its origin the name has spread very widely, and is incorporated with the languages of Southern India.
99	See also *Piteira*.
...	A general term on the Caribean coasts and Islands for the longer staples obtained from *Agaveae* and *Bromeliaceae*. In S. America it is replaced by *Caraguata* and *Ibera* with their variations. *Pita* is often used with a specific addition, *e.g.*, *Pita de corojo* (a Palm fibre), *Pita pinuella* (see the next), etc. In India it is restricted to *Euagave*.
93-98	In Panama and on the adjoining coast *Pita* is or was equivalent to *Istle* (1), or *Pinuella*, which is usually, we think, *Karatas Plumieri*, Morren. Cf. *Bromelia Pita*, *Istle* (1) and (2), *Pita Bromelia*, *Pinuella*, *Silk Grass*, &c.
...	*Agave sisalana*, Perrine—*i.e.* (G).
93-98	This fibre was highly reported on as a fine fibre by London firms many years ago. It is said to be produced from *Karatas Plumieri*, Morren (= *Nidularium Karatas*, Lem.) which we identify with a plant that thrives in the Sibpur garden. See *Istle* (1), *Bromelia pita*, and *Silk Grass*.
93-98	Meaning "*Shoemakers thread.*" The leaves of this plant (says Seemann) furnish a strong fibre. He adds that the thread is extensively used by shoemakers. This is said of other 'Pita' fibres also by various authorities. *Bromelia Karatas* Linn. is = *Karatas Plumieri*, Morren.

Name	Authority	Language	Where used	Scientific determination
Pita fibre	Cameron (Bangalore Cat.)	English	S. India (Mysore)	*Agave mexicana*
Pita flax	Cleghorn (Forests and Gardens of S. India)	Do.	S. India	Ditto
Pita floya	Dodge	Spanish	Central America (Costa Rica)	*Furcraea gigantea*
Pita Hemp	Do.	Do.	America	**Yucca** and **Furcraea** spp.
Pita Kalabantha	Balfour (Cyclopædia)	Tamil	S. India	**Agave** sp.
Pite (1)	Du Tertre (in Sloane)	French	Antilles	*Agave* or *Furcraea* sp.
Pite (2)	Do.	Do.	Do.	**Tillandsia** sp.
Pite d'Haiti	Fasio (in Journ. d' Agric. Trop. 1904, No. 41 p. 343)	French	France, Algeria, &c.	**Furcraea** sp.
Piteira	Martius	Portuguese	Portugal and Brazil	*Agave americana*
Pitha Kalabanda	Balfour (Cyclopædia)	Tamil	S. India	*Agave vivipara*, Linn.
Pitha Kalabuntha	Watt E. D.	Do.	Do.	*Agave americana*, Linn.
Pitta	Humboldt, &c.	Spanish	America and West Indian Islands	Ditto

Page	Remarks
125	Mr. Cameron correctly separates the fibre Agave from the true *americana*, but as to the specific name see *Maguey* (4), *Mexican Aloe* (1), *Tequila*.
96	Fibre produced from Agave (D) or (J) or perhaps from a Furcraea.
94-95	*Furcraea*, as Mr. Hemsley has remarked, seems to replace *Agave* in the S. E. of Central America; in cultivation or as an escape it extends to the Orinoco region, northern Brazil (with Guiana), Cuba and the Antilles. There is much confusion as to species, but all are best suited to a gravelly soil, with a fairly moist climate. See *Cabuja*, *Mauritius Hemp*, *Piet*, &c.
98	We should think this covered *Agave* and certain *Bromeliaceae* also.
98	Cf. *Peetha Kalabunda*.
117	Du Tertre speaks of two spineless sorts of *Pite*, of which Sloane thought one might be his *Aloe Yuccae foliis* (*Henequen* of the Islands) but see *Piet* also.
...	An epiphyte belonging to the pineapple family. Cf. *Caraguata* IV.
109	See *Hayti Hemp*.
85	The garden plant seen in Brazil by *Martius* was probably one or other of the varieties of *A. americana* Linn. *i.e.*, our (B). He says that he never saw *A. americana* naturalized in S. America.
91, 147	Perhaps Agave (J), but there is great confusion in the vernacular names recorded in most books from S. India.
86, 147	No doubt Agave (D), at least usually. See *Peetha Kalabanda*.
108	See *Pita* (4) above.

Name	Authority	Language	Where used	Scientific determination
Pitta Ahetz	Sloane	Malagasey	Madagascar	*Aloe Yuccae foliis*
Pitte	Lamarck Dict. I. 53	French	France and French colonies	*Agave foetida Linn.*
Pole	...	English	Cosmopolitan	Agaveae
Pole plant	Miss. Gdn. Report 1896	Ditto	America	Ditto
Pooty Mungem	Mad. Exh. Cat. 1857	Canarese	S. India (Mysore)	*Aloe* sp.
Pulque	Humboldt (and others)	Spanish	Central America (Mexico)	*Agave* spp.
Pulque Agave	Squier, Bates, and others	English	Ditto	*Agave mexicana*

Page	Remarks
98, 113	We have not traced Sloane's authority (possibly an edition of De Flacourt's work), but the plant was perhaps a *Sansevieria*, or the *Bow-string Hemp* identified by *Martius* with 'Sanseviera lanuginosa,' which appears however to be a *Cordyline*; see *Bow-string Hemp* (3). On the other hand there is a *Furcraea madagascariensis* of Haworth; what this was we cannot say, but it is highly improbable that any *Furcraea* should be found in Madagascar unless introduced from America, through the Mauritius possibly, or St Helena.
...	See *Anana de Pite, Bowstring Hemp* (3) and *Laffa*. Identified by Lamarck with a *Furcraea* grown in the *Mauritius*.
80	The scape or flowering stem of *Euagave* and *Furcraea*. When this is thrown up from the trunk the plant is said to 'pole.' Cf. *Hampe, Mast*, and *Maypole*.
81	*Bulbil*, which see.
96	This is given as the source of ropes which were carefully tested at the Arsenals and exhibited in 1857 at Madras. 'Pooty Munjee' is referred to '*Hibiscus cannabina*.' See also *Cuthala Nar*.
...	The national beverage of *Mexico, (Tequila, Sotol, Mescal*, &c. being distilled spirit), obtained from sundry species of *Euagave* (See *Pulque, Agave* &c.) The name occurs under the form of *Pulco* and *Pulcre* in writers of the early 17th Century, but the origin is obscure, and the statement that *Pulcu* is an Araucanian word for a drink of Peru wants confirmation. 'Pulcro' is a Spanish word, and *Pulco* or *Pulque* may be derived from it. *Pulqueria* is a shop or booth for the sale of *Pulque*, also called *Cantina*.
98, 140, &c.	The true *Agave americana* of Linnaeus, (B) of this Bulletin, is to all intents a purely ornamental species, and its native country is not known at present. It is practically of no economic importance. Whether *Agave Vera Cruz*, Miller, D of this Bulletin *(A. americana* and *A. mexicana* of S. Europe) is one of the Pulque yielding species or not remains doubtful. Recent American authorities mention *A. atrovirens* of Karwinski (which is commonly identified with *A. Salmiana*, Otto) as the chief source in the Apam plain and other centres of the *Pulque* cultivation. This appears to be near our *Agave* (C) sometimes called, but wrongly, '*A. Jacquiniana*.' '*Agave mexicana*' is a name to which there is practical objection. *Ignatio Blasquez* (quoted by Dodge) states that there are 33 varieties of *maguey* which grow or are cultivated in the Apam district and 10 Pulque Magueys in Cholula. The brothers Blasquez held that the best species of Pulque Maguey was undescribed, and named it '*A. Maximileanea*,' but their distinctions were too fine for either scientific or industrial purposes, apparently.

Name	Authority	Language	Where used	Scientific determination
Quetzalychitli	Hernandez	Aztec	Central America (Western Mexico)	**Agave Wightii** (of this Bulletin)
Qui	Martius	Maya Indian	Central America (Yucatan, &c)	**Agaveae** spp.
Rail Kattalai	Govt. Botanist Madras	Tamil	S. India (Tanjore)	**Agave Vera Cruz,** Mill.
Railway aloe	Do.	English	S. India	Ditto
Raiz de Zacaton	Kew Sel. Papers (Addl. (Ser. II) LXXIX)	Spanish	Central America (Mexico)	*Epicampes Macroura,* Bth.
Rakas	Balfour (Cyclopædia I. 51)	Hindustani	S. India	*Agave americana*
Rakashi mattalu	Mukerji (Desc. Cat. Ind. Prod. Amsterdam, etc.)	Telegu	Do.	*Agave americana*
Rakasi Matta	Govt. Bot. Madras	Telegu ?	S. India (Ganjam)	**Agave Vera Cruz,** Mill.

Page	Remarks
91, 102, 147	The drawing and description of this '*Metl*' answer well to our Agave (J), which has not apparently been described from America by any recent author: but this is hardly surprising, as the country about *Mazatlan*—where Hernandez says it was found in warm places—is comparatively little visited. He says others call it 'Metl Pitae' (*i.e.* 'Thread Agave') and that the fibre was prized specially for cloth weaving. It is plainly a *Euagave*, and though the stock of *Theometel* is like that of *A. Wightii* in the sketch, the leaf of this other is much nearer (J)—or the *Tequila* (which see); while the description fits (J) better than either (E) or (F), which moreover seem to affect the '*Templada*,' or plateau, rather than the coast belt or the deep hot canons (*barrancas*) of Jalisco, etc. The second part of the Mexican name seems to be another masquerade of '*Ixtli.*' See also *Yztli.*
145	'Qui' or 'Quil' seems to mean 'herb' or 'grass' in several languages of Central America, and in Yucatan was applied to the fibre yielded by various *Agaves*, *Furcraeas*, and *Bromeliaceae*. The Maya Quiche country extends from near Vera Cruz to San Salvador taking in both coasts from Guatemala to Honduras, but towards the north is confined to the tropical belt on the Gulf of Mexico. The original Istle of the Mayas was perhaps *Karatas Plumieri*, said to abound in the wild parts of Nicaragua. Tradition bears that the *Henequen* was introduced by a Toltec dynasty from Central Mexico. See also *Yztli*, *Yacqui*, *Yashqui*, and (for the Mangue dynasty) *Maguey* (2) and *Magueyes* (1)
86, 147	'Railway Aloe.' See the next.
86, 147	In Madras the 'Railway Aloe' is commonly Agave (D). In Northern India the same species has been used, in parts, for railway fencing, but in the drier tracts Agave (F) has been substituted. Agave (E) is used also.
...	Often called (see Dodge) simply '*Raiz*,' *i.e.* roots. Cf. *Aloe fibre*, *Broom root*, *Brush fibre*, *Mexican fibre*, *Mexican Whisk* and *Reju*. *Raiz* is said to be corrupted into 'rice root.'
...	From the Sanscrit *Rakshasha* = an evil demon. Names of Agave species are frequently compounded with this (See *Bramarakashie*, etc.) Spelled in old reports, etc. as 'Rakus.'
96	See also Rakshi Matalu under *Agave americana* in Watt E.D., and the following.
86, 147	Ditto ditto.

Name	Authority	Language	Where used	Scientific determination
Rakasi Mattalu	Govt. Botanist Madras	Telegu	S. India (Nellore)	**Agave Vera Cruz,** Mill.
Rakas patta	Watt, E.D.	Hindustani	India (Deccan)	*Agave americana*
Rakshasha Bali	Govt. Botanist Madras	Telegu	S. India (Cuddapah)	**Agave Vera Cruz,** Mill.
Ram Bans	R. E. P., Govt. of India	Hindi	Rajputana ? (Jaipore)	**Agave Cantala,** Roxb.
Rambanskeora	Supdt. Govt. Gardens U.P. Agra and Oudh	Do.	N. W. India (Saharanpore, etc)	Ditto
Ramkanta	Watt E.D.	Do.	India	*Agave americana* Linn.
Raspador	Coulter	Spanish	America, West Indies, and Pacific Islands	...
Ravana	Ainslie	Canarese	India	*Aloe perfoliata,* Linn.
Ravana Meshid	Buchanan (afterwards Hamilton)	'Karnataka' (*i.e.* Canarese)	S. India (Mysore)	*Agave vivipara*
Reda aonas	Liotard	Guzarati	Western India	*Agave* Sp.
Reju	Imp. Ins. Hand-bk. (Ind. Sec.) No. 12	Bengali	India (Calcutta)	*Epicampes macroura* Bth. ?

Page	Remarks
86, 147	See also 'Rakashimatalu' under *Agave americana* in Watt E. D. and the following.
96	Possibly our Agave (D) : 'patta' = leaf in Hindustani ;— also spelled Rakis pattah.
86, 147	Cf. the preceding.
87, 147	'Divine (*i.e*, wild) bamboo.'
87, 90	See the preceding and *Banskeora* applied to (E) as contrasted with (J).
96	Cf. *Rambans* ('Kanta' = 'thorn' or 'prickly shrub,' etc.)
...	A machine for scutching the leaves of fibre-yielding *Agaveae*. Originally (in Mexico) an iron scoop or spoon for scraping the *Cajete* (which see) of a *Pulque Agave* plant to promote the flow of sap after drawing off the daily storage.
113	Ainslie states that (with the scape presumably) this attains 10—12 feet in S. India.
91, 131, 147	Agave (J) = '*A. vivipara*' of Wight, *not* of Linnæus. Ainslie says that Ravana Meshid is Canarese for a true *Aloe*, which produces the drug in India.
...	Evidently a survival from the days of Portuguese ascendancy. *Rede* = net and *aonas* = pineapple. Cf. *Cravata de rede*. Agave fibre is used by fisher folk on the Indian coasts and islands for nets, etc.
...	Imported formerly from Mexico for brush-making. The ordinary supply of 'whisk' seems to come from the N. W. Terai (Moradabad etc.) and to consist of the roots of one or more *Andropogons*. Cf. *Raiz de Zacaton*.

Name	Authority	Language	Where used	Scientific determination
Sabbare	Forskohl Fl. Aeg. Arab.	Arabic	Arabia Felix (Yemen)	*Aloe maculata*
Sabr	Do.	Do.	Asia, Africa, etc.	*Aloe officinalis*
Sacci	Engelmann	Maya Indian	Central America (Yucatan)	*Agave rigida* var. *longifolia.*
Sacqui	Martius	Ditto	Ditto	*Agave* sp.
Saganara	Madras Exh. Cat., 1855	Telegu	S. India (Masulipatam)	Sansevieria ?
Saganara Matha	Govt. Botanist Madras	Ditto	S. India (Kistna)	Agave Vera Cruz, Mill.
Sagi Matta	Balfour (Cyclopædia)	Telegu	S. India	*Agave americana*
Samato	Balfour (Cyclopædia)	Telegu	S. India	*Fourcroya cantula*
Samba kattalai	Govt. Botanist Madras	Tamil	S. India (Salem)	Agave sp.
San ka Nar	W , E. D.	Deccani	S. India (Deccan)	*Agave americana*
Sauga Rope	Madras Exh. Cat. 1857	Telegu	S. India (Guntoor)	*Sanseviera Zeylanica*
Saugoo nara	Do.	Do.	S. India (Vizianagram)	Ditto
Saparra	Martius	Sicilian	Sicily	Ditto
Seaside Aloe	Ainslie Mat. Med. (1826) ii. 169	English	S. India	*Aloe littoralis*, Koenig

Page	Remarks
107	Forskohl distinguishes this from 'Aloe officinalis' to which he attributed the 'Socotra Aloes.' Cf. *Sabr.*
113	Lane and Burton quote certain meanings of the Arabic word which refer to 'patience' or 'endurance,' but these are most likely secondary, and founded on the plant's remarkable vitality (cf. *Sempreviva).* There are many variations, *e.g.*, Sabir, Sibir (Persia), Cebar and Sebar (Spain), Sobr (Palestine), Sabila and Zabila. See also *Acebar, Azeure, Azul,* etc. Sabarra and Seubbara (Africa) are perhaps of independent origin, and have given rise to a number of the names of the naturalized *Agave* of S. Europe (see *Sabbare, Seubbara, Saparra,* etc.)
143, 144	The chief *Euagave* of the Yucatan plantations differs from the kind Dr. Perrine selected for acclimatization in Florida; it is understood to be the *Sacci, Sacqui* or *Sosquil* and near Agave (G.) = *A. sisalana* Perrine. Spelled by Dodge '*Saci,*' but the word is certainly compound, and the second syllable is '*Qui*' (q.v.) This is *not* the 'sisal' of India or the Bahamas, which is '*Yashqui.*'
77	Sent as *Bowstring Hemp.* Martius seems to have thought that this might be *Marsdenia tenacissima* W. and A. (See *Bowstring creeper*).
86, 147	Cf. the next.
96	Cf. the preceding. Spelled by Brown (Handbook of Agri-Hort. Soc. Gdn. and neighbourhood of Madras, 1866) as Sagi Mutta. Perhaps from 'Sagi' (Malay) = *Metroxylon* sp. (a palm).
130	*Fourcroya Cantula* of Haworth is a misnomer, apparently, for *Agave Cantala,* Roxb.
147	This is very nearly allied to Agave (J), but seems a lighter and smaller plant altogether, with the leaves narrower. The variegated garden kind hitherto referred as a variety to Agave (J) may be the same as Mr. Barber's plant, which comes from Tinevelly, etc. Cf. *Seemai Kattalai* and *Seeppu Kattalai* also.
96	'San' is primarily *Crotalaria* or *Hibiscus* fibre. Cf. *San ka nar* and *Belati pat.*
77 – 77	Cf. *Saganara matha,* which is Agave (D). Roxburgh does not mention this set of names apparently. 'Sauga' suggests the Malay sago palm, to which Agave might be likened, but hardly *Sansevieria.* The Guntoor exhibit was rope made from '*Sauga*' apparently.
107	From '*Sabarre*' or '*Seubbara*' which is applied to *Agave* spp., naturalized in N. Africa (probably to *Aloe* originally).
113	Cf. *Small Aloe.*

Name	Authority	Language	Where used	Scientific determination
Seema Kathalai	Govt. Botanist Madras	Tamil	S. India (S. Arcot)	**Agave Wightii** (of this Bulletin)
Seema Kattalai	Do.	Do.	S. India (Tanjore)	Ditto
Seemai Kattalai	Do.	Do.	S. India (Tinnevelly)	**Agave** sp.
Seemay cattalay	Mad. Exh. Cat. 1857	Tamil	S. India (Chingleput)	*Fourcroya gigantea*
Seemay Kathalay	Brown and Wood	Tamil?	S. India	*Furcraea gigantea*, Vent.
Seemay Kuttalay	Madras Exh. Cat. 1855	Tamil	S. India (Madura)	**Furcraea** sp.
Seeppu Kattalai	Govt. Botanist Madras	Tamil	S. India (Tanjore)	**Agave Vera Cruz**, Mill.
Sempreviva	Danielli	Italian	Italy	*Agave americana*, Linn.
Seubbara	Balfour (and others)	Arabic	N. Africa	*Agave americana*
Short aloes	Mad. Exh. Cat. 1855	English	S. India (Mysore)	*Agave americana*
Silk Grass (1)	Spon	English	England and America	*Nidularium Karatas*

Page	Remarks
91, 147	Cf. *Samba Kattalai* and the following.
91, 147	Ditto ditto.
87	See *Samba Kattalai.*
94, 95	Also spelled 'Cuttalay.' Cf. *Seemai Kattalai.*
94, 95	Cf. the preceding.
94, 95	'The small Aloe', and should therefore be a true *Aloe*, but see the preceding.
...	Cf. also the preceding.
114	The true *Aloe*,—and hence the *Agave*,—was called 'Sempervivum' and 'Aizoon' in Mediaeval Europe with reference to ~~their~~ its tenacity of life, but the connected traditions (see *Sabr*) are of Syrian (or Nubian) origin.
96	See *Sabbare*, *Sabr*, and *Saparra.*
113	The scientific names of this and *Long Aloe* seem to have been transposed (See *Long Aloe*).
93-98	Spon's reference is correct for the coast from the Gulf of Campeachy to near Vera Cruz, where a 'fine' fibre seems to be obtained from a Bromeliad which is probably the species quoted = *Karatas Plumieri* of E. Morren, and perhaps the '*Bromelia Karatis*' of which Squier gives an illustration. See *Anana de pite*, *Bromelia Pita*, *Caraguata* (1), *Caraguata* V, *Caroata*, *Curratow*, *Gravata*, *Grawatha*, *Henequen* (1), *Istle* (1) and (2), *Ixtle* (1) and (2), *Ixtli* (1) *Karaota*, *Mexican Fibre* (3), *Pinuella*, *Pita* (3), *Pita Bromelia*, and *Pita de Zapateros*, also the following.

NAME	Authority	Language	Where used	Scientific determination
SILK GRASS (2)	Temple (in Journal Soc. of Arts, V. 125)	English	Central America (British Honduras)	*Bromelia sylvestris*
SILK GRASS (3)	Dodge	Ditto	England and America	*Bromeliaceae and Agaveae*
SILK GRASS (4)	Kew Sel. Papers (Addl. Ser. II) LXV	Ditto	Jamaica	*Furcraea cubensis, Haw.*
SILK OF GRASS	Hariot (in Sloane)	Ditto	Central America	*Aloe Yuccae foliis*
SIMAI KATHALAI	Mukerji	Tamil ?	S. India	*Furcraea gigantea*
SIME KATTALAY	Balfour (Cyclopædia)	Telegu	Ditto	*Fourcroya Cantula Haw.* [formerly *Agave Cantula* Roxb.]
SIME KATTALE	Liotard	Canarese	S. India (Mysore)	*Agave vivipara*
SIROOGHOO KUTTALAY	Ainslie, Mat. Med. 1826, ii 169	Tamil	S. India	*Aloe littoralis*, Koenig
SISAL	...	...	...	...

Page	Remarks
98	From Temple's description this name, given by the denizens of British Honduras to the '*Istle*' or '*Pita Bromelia*' (which see), probably indicated *Karatas Plumieri*, E. Morren: for fuller references see the preceding.
98	"Some of the species of fibres that have been called Silk grass . . . . . are *Ananas sativa*, *Karatas Plumieri*, *Bromelia sylvestris*, *Furcræa Cubensis*, and other similar forms, while the name has even been applied to the fibre of some of the Agaves. Its use, therefore, without the botanical name of the species can only add to the confusion which already exists."
94, 95, 98, 128	Sir Daniel Morris thinks that *Furcraea cubensis* may also be a source of silk grass fibre in Yucatan (cf. *Sisal Hemp* and *Cajun*).
Do.	See *Grass Silk*, etc.
94, 95	Cf. *Seemay Kathalay* above.
94, 95	Probably Mauritius Hemp, wrongly identified with Agave (E) in consequence of Haworth's having transferred Roxburgh's plant from *Agave* to *Furcraea*, erroneously.
~~Do.~~	As the fibre is said to be very long, fine, and white, and the English name is given as 'Green aloe,' the fibre was no doubt Mauritius Hemp, and from a *Furcraea*. See *Green Aloes* also.
...	Cf. *Kattali*, &c., and see also *Kuttalay*.
...	A port on the coast of Yucatan, formerly the chief outlet for the fibre of the Merida district. The export trade is said to have now shifted to Progreso.

Name	Authority	Language	Where used	Scientific determination
Sisal Hemp	Martius (Beitrag etc. p. 39), also Kew Sel. Papers (Addl. Ser. II) XLII and XLIX	English	Cosmopolitan	**Agave longifolia,** Engelmann **Agave sisalana,** Perrine, etc.
Small Aloe	Ainslie Mat. Med. (1826) ii 169	English	S. India	*Aloe littoralis* Koenig

Page	Remarks
146, also 89, 143, 147	The fibre long exported from the coast of Yucatan was mainly derived from a *Euagave* to which the name of *Sacqui* ('Qui' being 'fibre') was given by the *Mayas*, a civilized nation (see Keane in Stanford's Compendium, '*Central America*') who were once the ruling power from the Nicaragua Isthmus to the Vera Cruz coast-belt of Mexico. Other fibres seem to have been exported also, on their own merits, or mixed with the fibre of the *Sacqui*, which is still grown in plantations on a large scale. One may have been from a *Furcraea*, and another is called 'Istle,' but whether this 'Istle' was the same as the *Pita Bromelia* or *Silk Grass* of Honduras is uncertain; through mixing of the fibres, or confusion over local names Yucatan fibre has been called 'Silk grass' and 'Istle,' and a *Euagave* has been named '*Agave Ixtli*' on the assumption that it is the source of 'Yucatan Istle fibre.' In 1838 Dr. Perrine, then U. S. Consul at Campeachy, took several kinds of *Euagave* to the coast of *Florida*, and started plantations, which were ruined by a Seminole incursion, and the plants have run wild; but the species which he judged best adapted for the American plantations was Agave (G) of this Bulletin, *i.e.*, *Agave sisalana*, Perrine, which has since spread to the Bahamas, and has been introduced into British India, South and East Africa, Australia, the Pacific Islands, and the Philippines. *Engelmann* in a valuable account of this group of Agaves has treated the *Sacqui* or Sosquil as well as the *Yashqui* [which is (G) or Perrine's Agave] as 'varieties' of a supposed wild plant, which he further identified with a species described by Miller under the name of *Agave rigida*. We do not know what Miller's species actually was, but it certainly was *not* Perrine's fibre Agave. There is only one *Sisal* Agave in India, which has often prickles on the edges of the leaf, sometimes many, sometimes a few only; the best sort is entirely free of margin prickles, but is liable (in this respect) to vary. The 'longifolia' of Engelmann, which is the '*Sacqui*' chiefly grown in Yucatan, is *not* known so far in India, and is a different plant from the *Yashqui* (which is Perrine's species and the 'Sisal' of India). It is doubtful if either the *Sacqui* or the *Yashqui* exists anywhere except in cultivation. Both 'Yashqui' (A. *sisalana*, Perrine) and 'Sacqui' (A. *longifolia*, Engelmann) are grown in Yucatan, but *A. sisalana*, Perrine is the plant that has been introduced in India, and in the Bahamas. '*Bahama Hemp*' has been attributed to '*Agave rigida* var. *elongata*', on the supposition apparently that the *Sacqui* had been so described by Engelmann; it is true that Engelmann supposed that the *Sacqui* might be 'A. elongata' of Jacobi, but his *own* name for '*Sacqui*' was 'var. *longifolia*.' We distinguish these plants thus: *Sacqui, i.e.*, the chief 'Sisal' of Yucatan = A. *longifolia*, Engelmann; *Yashqui, i.e.*, the Bahamas Hemp, and E. Indian 'Sisal' = A. *sisalana*, Perrine. See also *Henequen* (3), etc.
...	As compared with *Agave* and *Furcraea* species called '*Large Aloe*' or '*Great Aloe*.' See *Small Aloe*, and *Seaside Aloe* also.

Name	Authority	Language	Where used	Scientific determination
Smokva arapska	Visiani	Sclavonic	S. E. Europe (Dalmatia)	*Agave americana* Linn.
Soap Agave	Smith (Dict. Ec. Plants)	English	Central America (Mexico)	*Agave Saponaria*
Sacqui	Martius	Maya Indian	Central America (Yucatan)	*Agave rigida*
Sodursun	Liotard	Hindi	Central and N. W. India	...
Sotol	Rose	Spanish ?	Central America (Mexico)	*Dasylirion* sp.
Spanish Aloe	Guilfoyle	English	Australia ?	*Agave americana* Linn.
Spanish bayonet	Dodge	Do.	N. America	*Yucca spp.*
Spatone	Danielli	Italian	Italy	*Agave americana* Linn.
Sucker	...	English	Cosmopolitan	...
Sun ka nar	Ainslie	Deccani	Central & S. India	Agave sp.
Suvaru	Govt. Botanist Madras	Tamil	S. India (Tinnevelly)	...
Suvaru Kattali	Do.	Canarese	S. India (Bellary)	Agave Vera Cruz, Mill.

Page	Remarks
107	The species is believed to be Agave (D) and to have been brought to the Adriatic littoral from Sicily or Calabria where the true *Aloe* was introduced from N. Africa by the Saracens, and named from the Arabic. When the *Agave* came to S. Europe from America, sundry local names of the true *Aloe* were extended to it. See *Saparra*, etc.
97	*Agave Saponaria* of Lindley is identified with *A. brachystachys*, Cav. of the *Littaea* group, and the reference is doubtless to the *Amole* Agaves (see *Amole* &c.) Several of the West Indian *Euagaves*, however, are much used for scouring purposes (see *Keratto* also).
146	A spelling of *Sacqui* = *A. longifolia*, Engelmann.
...	Said to have furnished Jail factories with stock for paper-making in Dehra Dun and Moradabad (Agra Province) and to be called in Rohilkhand '*Baskitri*' (which see), also to grow wild in ~~Khatpur~~ (towards Central India). *Sukhdarsan* is the usual name of one or more species of *Crinum*, but none of the Indian species of *Crinum* or *Pancratium* is known to yield fibre, though they are nearly allied to the *Agaveae*. *Crinum asiaticum* var. *toxicaria*, Herb. is called (See Watt, E.D.) in Bengal *Bara Kanur*, while *C. latifolium* Linn. (perhaps wild towards Central India) is (Bengal Plants p. 1061) the true *Sukhdarshan*. The names *Kanwar* and *Kanur* have been confused possibly (see *Bara Kanwar*). Fibre from Euagaves has been largely used at different times for paper-making throughout India. *Baskitri* was perhaps Agave (E) or an allied species, and the reference to *Sudarsan* may be due to a mistake or to some very local application of the name, which may not after all be the same as *Sukhdarshan*. We do not know of either being applied to *Agave* in N. W. India.
98	A kind of spirit formerly supposed to be distilled from the juice of '*Agave americana*,' but now ascertained to be got from *Dasylirion* which does not belong to the *Agaveæ*.
...	Cf. *Mexican aloe*, etc.
78	See *Dagger Plant* also.
96	From the resemblance of the leaves to swords. Danielli gives several variations, *e.g.* Spata, Spadu, Spatona, Spatola, etc.
...	See *Offset*.
95	See *San ka Nar* also, but the name seems very doubtful.
147 (footnote)	This is a doubtful plant, probably the same as the *Sambakattalai* from Salem, and perhaps a form of (J), *i.e.*, *Agave Wightii*.
87, 147	This is a hedge plant; the preceding looks like a dwarf kind of a quite different species (J).

NAME	Authority	Language	Where used	Scientific determination
TABAGO SILK GRASS	Dodge	English	America	*Furcraea cubensis*
TACORI	J. Bauhin and Sloane	[Tupi Indian]	S. America	*Aloe Yuccae folii* (Sloane)
TALE NARU	Liotard	Canarese	S. India (Mysore)	*Pandanus odoratissimus*
TAPEMETE	Rose	Mexican	Central America (Mexico)	*Agave vivipara*
TAMPICO	...	...	...	...
TAMPICO FIBRE	Rose	English	America	*Agave* spp.
TEQUILA (1)	Rose (and others)	Spanish	Central America (Mexico)	*Agave* sp.

Page	Remarks
94, 95	Cf. *Silk Grass* (3) and (4) and *Nequametl* (2). Also spelled 'Tobago'. De Laet's drawing of the plant he called *Nequametl* (which see) was made in Tabago.
...	The older writers seem to have connected this in some way with the *Agaveae*, but it was doubtless the *Tagoara* fibre now ascribed to *Guadua Tagoara*, Kunth (of the Bamboo family).
...	'Tale' is properly a palm, but often applied to species of *Pandanus* in S. India.
...	Mr. Rose is referring doubtless to *Agave vivipara*, Baker, of which the description answers *A. vivipara* of Wight, *i.e.* (J) of this Bulletin. He observed it in Jalisco and Zacatecas on the sides of hot ravines, where thread is got from it for household uses. So far as we can judge from his description, the 'Tapemete' is not the plant called *A. vivipara* by Buchanan, and figured by Wight, though it may be very near it. It is probably the *Tepemexcalli* of Hernandez.
...	A port bordering on the State of Vera Cruz (in the Mexican Republic) from which fibre collected in *Tuia, Zacatecas* and other upland tracts is exported for brush-making.
...	This has often been regarded as co-extensive with 'Istle' and obtained in great part from '*Agave heteracantha*,' but there is considerable doubt as to what '*Agave heteracantha*' may be, and it is now certain that there are a number of species which contribute to the supply of 'Brush fibre' through the ports on the Gulf of Mexico, of which *Tampico* as regards this branch of trade is the principal. It is also clear that *Ixtle* or Istle is applied in different parts of Central America to very different fibres: the Istle of British Honduras being derived from a Bromeliad and not from an Agave at all. Also sometimes called 'Tampico Hemp' (unless this is really something quite different).
98	A liquor (spirit) made from the sap of an *Agave*, chiefly in the States lying westwards from the capital (*Jalisco*, etc.). Mr. Rose says that the leaf is very narrow, and that it may be the same as *Huila* (which see), but in any case is not *A. americana*. If *Huila* be the same then it yields fibre also.

Name	Authority	Language	Where used	Scientfic determination
Teqûila (2)	Nelson	Mexican	Central America (Mexico)	**Agave** sp.
Thalay nar	Mad. Exh. Cat. 1857	Canarese	S. India (Madura)	*Pandanus odoratissimus*
Thembu nanut	Liotard	Burmese	Burma (Mergui)	*Agave americana*
Theometel	Hernandez	Aztec	Central America (Mexico)	**Agave** sp.
Toccon	J. Bauhin	Brazilian	S. America	...
Tol	Martius	French	Antilles	*Furcræa cubensis*
Toucon	Lery (in Sloane)	Do.	Do.	*Aloe Yuccae foliis*
Tow	...	...	...	...
Trap tree	Martius	English	Malaya (Singapore)	*Artocarpus* sp.

Page	Remarks
88, 89, 98, 125, 147	Mr. Nelson's *Tequila* seems to be the same as the preceding, excluding possibly the suggested identity with 'Huila.' It is grown in large plantations in the State of Jalisco (capital *Tequila*). Mr. Nelson's figure (Plate XXXV), which we had not seen when Parts I and II were written, shows an *Euagave*, of the Sisalana group, apparently, very closely resembling our Agaves (E) and (F), but especially the latter, which is Mr. Gamble's "*mexicana*." If, as seems not unlikely, certain of the species naturalized in India came originally from the Tequila and Zapotlan country, then possibly F='*A. mexicana*' of Gamble (and probably T. Moore), may be=*Tequila*; J=*A. Wightii* of this Bulletin (A. vivipara of Wight)=Bastard Tequila; E=*A. Cantala*, Roxb.=A. vivipara of Rose of which the description is not that of Wight's 'vivipara,' but would fit our (E) or Baker's A. *laxa*. See the preceding, also *Bastard Tequila*, and *Huila*.
...	Cf. *Tale Nar*. Spelled *Thaulay Nar* also. Pandanus is often spoken of as a fibre plant, but the commonest use seems to be by cutting strips from the leaf for mat-making, etc., rather than by extraction of the actual fibre.
96	Nanut=Pine apple ?
125, 127	Zuccagni refers Hernandez' plant to A. *Theometel*, Zuccagni. The trunk in Hernandez' representation is suggestive of Agave (J), but the leaves are quite different. Theometel extract was in great repute as an anti-periodic drug. It may not be an *Euagave*, and is seemingly unknown in India.
...	See *Toucon*.
...	See *Bois de Meche*, etc.
...	Sloane cites these with a query under the title quoted, which includes *Henequen*, etc. It was probably the fibre attributed by Squier to the *Ticu palm* of 'marshy grounds of the Orinoco' and the 'Tecum' as to which there is great confusion, but the different fibres under these names are got from different ~~species of~~ palm and not from any of the *Agaveae*.
...	Short curled or interlaced fibres, from certain *Agaveæ*, *Yuccas*, and *Bromeliceae*, as distinguished from the long staple of the best species of *Furcraea* and *Euagave* (*Sansevieria* also).
...	Cf. *Kantal* or *Kathal*. This is probably not the Jack fruit however, but the *Getah Tarap*=*A. Kunstleri*, King, of which Ridley (Flora of Singapore) says the bast is used for cordage and cloth-weaving. Mr. Ridley elsewhere says that locally fibre is got from an *Agave* but we do not know what the species may be.

NAME	Authority	Language	Where used	Scientific determination
VENETIAN WHISK	Kew Sel. Papers (Addl. Series II) LXXIX and LXXX	English	Europe, etc.	*Chrysopogon Gryllus*
VERA CRUZ	...	...	...	...
VERA CRUZ ALOE	Moon (Ceylon Catalogue)	English	Ceylon	**Agave Vera Cruz**, Mill.
WHITE FIBRE	...	English	England, India etc.	**Agave** and **Furcræa** also **Bromeliaceæ**
WILAYATI ANANAS	...	...	...	...
WILAYATI KANTALA	Stewart (Punjab Plants, p. 232)	Hindustani	N. W. India (Punjab)	*Agave Americana* L.
WILD ALOE	Liotard	English	Beluchistan	**Nannorhops Ritchieana**, H. Wendl.
WILD ALOE FIBRE	Mad. Exh. Cat., 1857	Do.	S. India (Bellary)	*Agave* sp.
WILD ALOES	Mad. Exh. Cat., 1855	Do.	S. India (Coimbatore)	Do.

Page	Remarks
...	See *Broom root*, *Brush fibre* (1 and 2), *Mexican Whisk*, etc.
...	A town and harbour on the Gulf of Mexico (State of Vera Cruz), which was and still is the chief seaport of the central parts of Mexico. It lies in the warm coast strip below the plateaux and the Cordilleras, but as the products of Mexico found their way largely by this route to Europe, plants have been attributed to the Vera Cruz neighbourhood which are not found there or even very near it.
131	Agave (D) most likely. We have seen no Ceylon specimens. The name has often been used in Europe also, but it is not always easy to say which species may have been intended. The true plant was first described by *Miller*, afterwards in German (very well so far as the leaves go) by Gmelin (*Onomat.* Frankfort and Leipzig 1772, p. 202) under the name of *A. Vera Crux.* (See also Dietrich, *Nachträge* I/135 where Miller's name is given correctly.)
...	A term sometimes used for fibres from the *Agaveae* (and probably also from *Bromeliaceae*, e.g., the *Pita Bromelia*) as distinguished from the Manila Hemp (see *Abaca*) obtained from *Musa textilis*. In Yucatan, on the other hand, the *Euagave* fibres were divided by the natives into 'white' and 'green,' which had reference to the colour of the pulp before heckling apparently.
...	See *Bilat ananas*.
95	This was doubtless on the supposition that Agave (J), which is self-maintaining in parts of the Punjab, was a native of India as compared with other kinds of *Agave* (notably the garden *A. americana* Linn.) which were known in cultivation. Other species than (J) are now, however, to be found in the Punjab in hedges.
...	See also *Pesh* and *Aloe*.
96	No doubt (J) or (D). Sent in 1855 from *Nellore* without clue to the plant. *Aloe perfoliata*, a true aloe, is said to be abundant and to grow to a great size in Mysore, etc., so that fibre from this has probably been frequently confounded with that from *Agaveae*. Cf. *Hedge Aloe* (1) and (2).
Do.	Ditto Ditto Ditto.

NAME	Authority	Language	Where used	Scientific determination
YASHQUI	Engelmann	Maya Indian	Central America (Yucatan)	**Agave sisalana**, Perrine
YAXCHE	Dodge	Aztec	Central America (Mexico)	*Bombax ceiba*
YAXCI	Miss. Gdn. Rept. 1896	Maya Indian	Central America (Yucatan)	**Agave sisalana**, Perrine
YANUGA CALABUNDA FIBRE	Mad. Exh. Cat., 1857	Telegu	S. India (Kurnool)	*Aloe perfoliata*
YENUGA KALABANDA	Govt. Botanist Madras	Do.	S. India (Gantur, Kurnool, Nellore)	**Agave Vera Cruz**, Mill.
YENUGA KALABONDA	Do.	Do.	S. India (Cuddapah)	Ditto
YENUGA KALAMANDA	J. A. C. Boswell (Nellore Manual)	Do.	S. India (Nellore)	**Agave** sp.
YSTLE	Miss. Gdn. Rept. 1896	Mexican	Central America (Arizona, Texas and southwards)	*Agave Lechuguilla*, Torrey and allied species
YUCAY	Mad. Exh. Cat. 1855	Canarese?	S. India (Mysore)	*Aristolochia indica*
YUCCADA FIBRE	Mad. Exh. Cat. 1857	~~Aztec~~ English	Central India	...

Page	Remarks
...	Agave (G) See *Sisal hemp.* Spelled by Martius *Yaxqui*, and by others *Yaxci, Yaxqui* &c.
...	A cotton tree: the down from the capsules is used for stuffing pillows &c.
...	See *Yashqui.*
...	Cf. the following.
...	Cf. the following and the preceding, also *Enugakalabanda*, etc.
...	Ditto ditto ditto.
...	Probably Agave (D) as above.
...	Cf. *Istle*, &c.
...	This is given as 'Yucay, white' and is followed by 'Yuccay, red' without any clue to the origin of the latter. There is evidently some mistake. None of the Indian *Aristolochias* are known to have yielded fibre, while *Yekka, Yekkada, Yokada*, &c., are names of the well known '*Yercum*' (a *Calotropis*). See the next also.
...	'*Yuccada fibre*' sent from Hyderabad was placed among 'unclassified barks' in 1857, but '*Yuccada Naru*' from Bangalore was referred to *Yucca gloriosa*. *Yakkada Naru* is given in the Mysore list of paper fibres (in Liotard '*Yekkada naru*'). True *Yucca* and *Agave* have been a good deal confused in S. India.

Name	Authority	Language	Where used	Scientific determination
Yztli	Hernandez	Aztec	Central America	...
Zabbara	Danielli	Italian (Provincial)	Italy	*Agave americana*, Linn.
Zabbara di ghai	Do.	Do.	Do.	Ditto
Zamarra	Do.	Do.	Do. (Calabria)	Ditto
Zambarone	Do.	Sicilian	Sicily	Ditto
Zaparra	Do.	Italian (provincial)	Italy	Ditto
Zubbur	Do.	Arabic	N. Africa	...
Zugo de Coc oyza	Humboldt (Ex Miss. Gdn. Rept. 1896)	Spanish	Central America	*Agave americana*, Linn.

l.c.

Page	Remarks
...	The mineral obsidian, from which, as Hernandez recounts (Ant. Rech. p. 339) the native Mexicans, before the use of metals was discovered, made their swords, daggers, knives, arrow-heads and spear blades. Even after the reduction of the country by the Spaniards, obsidian knives only were used to cut the leaves of the 'Octli' ('Pulque') yielding *Agaves* (Recchi has made nonsense of the text s. v. 'Metl seu Maguei' by omitting a letter), and the name of *Yztli*, *Ixtle* or *Istle* was no doubt taken from the likeness of the ensiform leaf to the 'ill-omened and atrocious blades' with which the Aztec champions would 'divide an enemy at one blow into two pieces.'
96	i.e. *Agave Vera Cruz*, Miller, the naturalized species in S. Europe, from the N. African *Seubbare* or *Sabarre*, or from *Sabr*, the true aloe. See *Sabr*, *Seubbare* etc.
96	See the preceding.
109	See the next.
109	Danielli derives this from 'Zanbar' which he says means threads (of wool) in Arabic, but the word he means is perhaps '*Zaubar*.' These variants may be from *Musambra*, the Arabic name for the drug as distinguished from the plant, which has been taken into several languages, in India particularly.
96	See *Zabbara*, *Saparra*.
96, 109	Martius gives this as *Zaubar* which is no doubt = *Seubbare*. It is quite possible that there may be such words as 'Zaubar' or 'Zambar' in the N. African dialects of Arabic, and that these are applied to the *Agaves* naturalized along the coast of *Algeria*, etc.; but the Saracen ascendency in Sicily and S. Italy had ceased before the *Agaves* reached either Europe or Africa, and the names of the *Saparra* and *Zambarone* series were given to the true *Aloe* in the first instance presumably.
96	The juice of young plants is said to be used locally as a caustic in surgery. Writers on the West Indies mention the juice of different *Agaveae* as a detergent for wounds, etc. The juice from cut leaves of the *Sisal Euagave*, also (D), is more or less acrid, if they are much handled. That of *Agave* (H) is said to be uniformly harmless.

B. S. Press—18522—2,500—13-2-1907—E. J. H.

THE

AGRICULTURAL LEDGER.

1906.

INDEX.

A

Abaca, 158, 267 ; *see* Musa textilis.
Abacaxi, 158 ; *see* Ananas sativa.
Abdul Khalil, 91.
Abecedairs, 158 ; *see* Agave americana.
Abrus precatorius, 69.
Acacia Catechu, 23, 24, 40, 43.
———————, analyses of cutch made in Calcutta, 41, 42.
———————————— of extracts from by Professor H. R. Proctor, 40, 41.
——— catechuoides, 23, 24; *see* A. Catechu.
————————, which yields Pegu or Rangoon Cutch, 24.
——— Sundra, 23, 24, 43.
Acebar, 159 ; *see* Aloe Perryi.
———, 158, 187, 253 ; *see* Aloe vera.
Aceure, 158 ; *see* Aloe vera.
Achard, A. D., 57.
Acibar, 158, 159 ; *see* Aloe vera.
Acojote, a long gourd used for drawing off Agave sap, 181.
Acosta, 110, 231.
Adam's Needle, 175.
————————, (1), 158, 195 ; *see* Yucca gloriosa.
————————— (2), 158, 199 ; *see* Agave sp.
————————— (3), 158 ; *see* Yucca filamentosa.
Adenanthera pavonina, 69.
Adhatoda Vasica, 69.
Aechmea sp., 183.
Aegle Marmelos, 35, 70, 74.
Aeschynomene aspera, 70.
African Bowstring Hemp, 159, 177 ; *see* Sansevieria sp.
African Hemp, 158 ; *see* Sansevieria sp.
African Hemp, African Bowstring Hemp, 177 ; *see* Sansevieria sp.
Agave, 223, 225, 237, 245, 266.
Agave, and Furcraea, 116.
——— a small leaved species, planted on mud walls in Southern India, 147.
———, cider (Pulque), the national beverage of Mexico, 98.
———, cloth woven from the " floss ", 97.
———, colour of flower, 81.
———————— leaves, 82.
——— de Miel, 160 ; *see* Agave atrovirens (and other species ?).
———, description of capsule, 82 ; of flowers, 78 ; of inflorescence, 79 ; of leaves, 79, 80.
———, embryo and germination, 82.
———, extraction of fibre from the root not confirmed, 138.
——— fibre, binder twine made from, 175.
———, floss or tow obtained from, 97.
———, formation of suckers, 81.
———, frequency of flowers, 80.
——— in Hakluyt's Voyages stated to yield wine, vinegar, honey and black sugar, 110.
———, in India, literature on, 129, 130.
———, its discovery in Mysore, 131.
——— leaves and roots as detergents, 97.
——— leaves, paper parchment prepared from, 97, 109.
———, naturalisation in Africa, 131.
——— offsets, 239.
———, place in plant classification, 78.
——— plants, medical uses of, 97.
———————— sometimes divided into caulescent and stemless, 102.
———, production of bulbils, 81, 82.
———, ropes made with the roots, 138.
———, scape or flowering stem, 247.
———, species at Saharanpur, 132, 133.
——— spirit (Aguardiente or Fire-water), 98.

Agave, summary of useful species in India, 105, 106.
———————— reasons for names, 139, 147.
———, the central shoot made into fiddles by Apaches, 109.
——— the dried tissue as tinder, 97.
———— first use of the name, 107.
———— thread, 160 ; *see* Agave and Furcraea sp.
———, toiletsoap made from, 167.
——— wind-fertilised, 81.
——— americana, 80, 84-88, 96-100, 107-113, 117-140, 147, 158, 160-174, 178-181, 186-195, 200, 201, 208, 213-226, 233-254, 260-270.
————————, a garden Aloe of India, 84.
————————, so called, of West Indies, 125, 126.
————————, the true, not a fibre plant, 99.
——— angustifolia, 88, 126, 131, 162, 229.
————————, 88 ; *see* A. Cantala.
————————, 125.
——— atrovirens, 98, 100, 139, 140, 160, 181, 222, 225, 247.
——— brachystachys, 261.
——— bulbifera, 126.
——— Cantala, 82, 87-89, 100-106, 115, 127, 130-139, 147, 159, 163, 167-183, 198, 199, 213, 218, 219, 221, 227, 229, 237, 239, 250, 253, 265.
————————, a fibre plant, 101.
————————, described, 87.
————————, distribution in India, 100.
————————, largely grown near Bombay city, 177.
————————, the "poles" used for litters, 199.
——— Cantula, 92, 129; *see* A. Cantala.
————————, *var.* vivipara, 136.
——— cochlearis, 181.
——— Commelynii, 128.
——— cubensis, 125, 128, 222, 239.
——— decipiens, 82, 92, 93, 106, 142, 146, 189, 194, 207.
——————— described, 92, 93.
Agave elongata, 144, 147, 259.
——— falcata, 198.
————————, 199 ; *see* A. striata.
——— fœtida, 121, 123, 126, 174, 175, 178, 201, 229, 246.
——————— of Jacquin, 95.
——————— of Linnaeus, 95.
——— foliis latioribus, 123.
——— foliis spinodentatis mucronatisque, 107 ; *see* Agave sp.
——— fourcroides, 144.
——— fourcroydes, 141.
——— Gilbeyi, 98.
——— heteracantha, 232, 233, 263.
——— Houllettii, 135.
——— Ixtilli, 84.
——— Ixtle, 189, 191, 206.
——— Ixtli, 82, 93, 106, 142, 143, 146, 207, 259.
——————, 106 ; *see* A. decipiens.
——— ixtlioides, 94, 135, 141, 142, 189, 195.
——— ixtly, 141.
——— Jacquiniana, 85, 140, 191, 247.
————————, 140 ; *see* A. lurida.
——— Karatto, 128, 141, 147, 167.
————————, 123.
——— Karwinskii, 93, 94, 99.
——— Kunstleri, 265.
——— Kuntala, 212.
——— lævis, 135.
——— laxa, 88, 132, 265.
——— longifolia, 143, 146, 189, 191, 258, 259, 261.
——— lurida, 98, 99, 101, 119, 120, 122-127, 130, 131, 132, 133-135, 139, 140, 147, 191, 213.
————————, 86, 87, 163 ; *see* A. Vera Cruz.
——— Manguai, 126.
——— Maximileanea, 224, 247.
——— mexicana, 89, 101, 120, 125, 126, 128, 133, 137, 147, 224, 225, 233, 244, 246, 247, 265.
————————, 163 ; *see* A. Vera Cruz.
————————, *var.* cyanophylla, 89.
——— Milleri, 85 ; *see* A. americana.
——— Morrisii, 91, 167, 208.
——— Palo, 158, 183 ; *see* Tillandsia recurvata Willd. ?
————————, 173.
——— Picta, 163.
——— potatorum, 234.

Agave procumbens, 132.
——— revoluta, 143.
——— rigida, 94, 103-105, 123, 128, 134, 135, 137, 139, 141, 142, 143, 146, 147, 195, 209, 259, 260.
———————, *var.*, 170, 188, 196, 210.
———————— longifolia, 252.
———————— sisalana, 103, 242.
———————————— Cultivation and Experiment, 103-105.
——— Rumphii, 88, 133-135, 137, 168.
———————, species doubtful, 88.
——— Salmiana, 98, 140, 224, 245, 247; *see* A. atrovirens.
——— Saponaria, 260, 261.
——— Shawii, 233.
——— sisalana, 80, 81, 89-99, 103-106, 112, 117, 128, 135, 141-147, 165, 167, 179-181, 189, 191, 197, 202, 207, 225, 234, 235, 238, 243, 253, 258, 259, 268.
———————, introduction into Mysore, 103, 104, 105.
———————, largely grown near Bombay City, 177.
———————, 197; *see* A. rigida, also Aloe Yuccaefoliis.
———————, true sisal, 89.
——— ——— ? *var.*, 143.
———————— *var.* longifolia, 143.
———, Soap, 260; *see* Agave saponaria.
——— sobolifera, 125, 127, 131, 133.
——— sp., 77, 124, 128, 129, 158, 160, 164, 167, 168, 170-178, 182-194, 198, 202, 206, 208, 254, 259-268.
———————, products and vernacular names of America, 97.
———————, soap, obtained from, 109.
——— spicata, 126.
——— Theometel, 118, 127, 134, 265.
——— tuberosa, 123, 128, 130, 132; *see* Furcraea tuberosa.
——— variegata, 170.
——— Vera Crucis, 86, 130.
——— Vera Cruz, 79, 80-82, 85-87, 99-101, 106, 119, 123-126, 139, 140, 147, 159, 168, 171, 176, 192, 198, 208, 218, 226, 228, 234, 236, 240, 247, 248-254, 260, 266-271.
———————, distribution in India, 99.
Agave Vera Cruz, the common grey Aloe of India, 86.
——— virginia, 123, 124.
——— virginica, 78, 108, 121, 123.
——— viridis, 165, 199, 229, 241; *see* Furcraea sp.
——— vivipara, 78-92, 96, 100-105, 109, 120-127, 131-138, 147, 162, 163, 170-177, 182, 183, 188, 189, 194-200, 212-226, 230, 240, 244, 250, 251, 256, 262, 263.
———————— of Wight, 265.
——— vivipera (sic) of Linnaeus, 136.
——— vixipara, 88.
——— Wightii, 78, 80, 88, 91, 100, 105, 123, 128, 139, 140, 147, 163, 167, 171-177, 195, 202, 216, 217, 223, 225, 234, 238, 248, 249, 254, 261, 265.
———————— may develop a stem, 102.
———————, the small Aloe of India, 91.
———————, widespread in India, 102.
——— Wislizeni, 206.
——— yuccæfolia, 126.
Agaveae, 117, 243, 256, 267.
———- as detergents, 267.
———-, fibre-yielding, not yet sufficiently identified, 98.
———-, glossary of names and terms, 155, 156.
———-, juice from cut leaves as a detergent, 271.
Agaves are American, 107.
———, certain Indian, a possible source of Brush fibre, 221.
——— employed in making marine soap, 167.
——— in Algeria, 201.
———, key to Indian species, 83.
———, native soil and climate, 106.
——— of Bombay, 138.
———, summary of those known a century ago, 126.
———, the cabbage, 221; *see* Tampico fibre.
——— yielding American aloe fibre in India, 167.
———————— scouring material, 167.
Agua de Miel, 161, 231; *see* Agave atrovirens, etc.
——— Miel, 160; *see* Agave americana.
Aguardiente, a spirit obtained from *Pulque* which see, 98, 160, 161, *cf.* Cane, 161.

Aguardiente, in Mexico, a spirit now distilled from cane, 161, 231.
——— de Maguay, 160, 189; *see* Agave americana.
———, 160; *see* Saccharum officinarum.
Ainslie, Dr. W., 48, 183, 219, 221, 231, 251.
Aiton, W., 86, 87, 92, 119, 122, 123, 130, 139, 140, 147.
'Aizoon,' 255; *see* Aloe and Agave spp.
Aletris, 228, 229, 234; *see* Sansevieria Zeylanica.
Algeria, estimated number of Date palm trees in, 3.
Alkali soil, growth of date palm in, 7.
Allaguey, 160, 161; *see* Agaveæ sp.
Allen, 43, 44, 46.
Alligator Pineapple, 237; *see* Agave Cantala.
Allium sativum, 70.
Aloe, 229.
——, 159; *see* Aloe Perryi.
——, 255; *see* Aloe vera.
—— (1), 160; *see* Aloe sp.
—— (2), 160, 239, 241; *see* Nannorhops Ritchieana.
—— (3) americana flore luteo, 109; *see* Agave sp.
——, americana, 95.
———, 111-115, 119, 122, 126, 127, 130, 132, 137, 162, 165, 194, 195; *see* Agave americana.
——, Country, (1) and (2), 193, 215; *see* Aloe sp.
———, fibre, 190; *see* Agave sp.
———, 175; *see* Agave americana.
—— fibre, 77, 95, 96.
———, 99, 179, 221; *see* Agave sp.
———, 177; *see* Agave vivipara.
———, 249; *see* Aloe and Agave sp.
———, Bombay, 138; *see* Agave sp.
——— (1), 162; *see* Aloe indica.
——— (2), 162; *see* Agave americana, A. vivipara, Furcraea gigantea, Yucca gloriosa.
——— (3), 162, 179, 233; *see* Agave americana.
—— fibres, as classed by Indian writers, 95.
—— folio in oblongum aculeum abeunte, 116, 119.
——, Lesser American, 199; *see* Agave sp.
—— of Dioscorides (or Bitter Aloe), 107.
Aloe, probable derivation of the word, 161.
——, Small, of India, 91; *see* Agave Wightii.
—— americana ex Vera Cruce, 119.
——— folio viridi, 241; *see* Furcraea.
——— minor, 115, 117, 122.
——— muricata, 119.
——— polygona, 117, 121.
——— spinifera, 116.
——— sobolifera, 115, 116, 122.
——— tuberosa, 119, 128.
—— barbadensis, 122, 200.
—— Boemica, 162; *see* Agave americana.
—— brasiliensis = (caraguata), 115, 118.
—— Dioscoridis, 116.
—— ex America of Dodoens, 107; *see* Agave americana.
——— vera cruce, 123.
—— ferox, 115.
—— Florentina, 162; *see* Agave americana.
—— foliis lanceolatis integerrimis, 119.
—— folio in oblongum aculeum abeunte of Tournefort=Agave americana, 107.
—— indica, 161-163, 197, 220.
—— littoralis, 163, 188, 215, 219, 252, 256, 258.
—— maculata, 252.
—— officinalis, 252, 253.
—— palustris anglicana = Stratiotes aloides, 116.
—— perfoliata, 191, 196, 210, 214, 219, 250, 267, 268.
—— perrara, 115.
—— perrara Andalusiæ, 116.
—— Perryi, 159, 163.
—— polygona, 126.
—— purpurea lævis, 115, 116, 118.
—— secunda, 119, 188, 189, 226.
——— seu folio in oblongum aculeum abeunte, 116.
—— serrata major umbellifera, 115, 116.
——, small, 219, 253, 258, 259; *see* Aloe littoralis.
——— of India, 91; *see* Agave Wightii.
—— sobolifera, 123, 124, 125, 127.
——, Spanish, 260; *see* Agave americana.

Aloe sp., 107, 118, 160, 162, 170, 172-174, 184, 186, 190, 192, 196, 208, 210, 215, 218, 220, 221, 229, 236, 246, 261.
———, 88 ; *see* Agave Cantala.
—— Theometel, 116.
—— vera, 158, 163, 175, 185, 193, 196, 208, 210, 237, 251.
—— visci in modum arboribus innascens, 116.
—— vulgaris, 113.
——, Wild, 199; *see* Furcraea cubensis.
———, 239, 241, 266; *see* Nannorhops Ritchieana.
—— Yuccae foliis, 116, 168, 186, 187, 196, 200, 201, 203, 220, 240, 245, 246, 256, 262, 264.
——— of Sloane = *Henequen* of Oviedo, 128.
——— = Pati seu Metl lenissimum of Hernandez, 128.
Aloes (1), 162 ; *see* Aloe sp.
—— (2), 162 ; *see* Agave americana.
——- à petites feuilles, 162; *see* Agave angustifolia.
——-, Country, 187, 191, 193; *see* Aloe sp.
———, 199; *see* Furcraea cubensis.
——— (1), 190; *see* Aloe sp.
——— (2), 190; *see* Aloe sp.
——- d' Amerique, 162 ; *see* Agave americana.
——- Pite, 164 ; *see* Agave americana.
——- Pitta, 164; *see* Agave Vera Cruz.
——- Pitte, 164 ; *see* Agave americana.
——-, Socotra, 253 ; *see* Aloe officinalis.
——- Vert, 164, 199, 229, 241 ; *see* Furcraea sp.
Alog, 164 ; *see* Agave americana.
Alpinus, Prosper, 69.
Amaguey, 161, 164, 223 ; *see* Agave sp.
Amaryllideæ, 77, 78.
American Aloe, 99, 112, 115, 135, 161, 163, 165, 166, 179; *see* Agave americana.
——— (1), 164 ; *see* Agave americana.
——— (2), 166 ; *see* Agave americana.
——— fibre, 166.
——— Aloes, 159 ; *see* Agave sp.
Amhat, variety of Dates in Egypt, 16, 17.
Amole, 166, 261 ; *see* Agaveae spp.
——— 167 ; *see* Agaves used as detergents.
Amolilla, 167 ; *see* Prochnyanthes.
Amri, variety of Dates, in Egypt, 16.
Anai, 169, 215 ; *see* Agave americana.
Anai Kathalai, 166, 167, 215 ; *see* Agave Vera Cruz.
—— *Kattalay*, 168 ; *see* Agave americana.
—— *Kattale*, 193 ; *see* Agave Vera Cruz.
—— *Kattaley*, 167, 168, 169 ; *see* Agave americana.
—— *Kuttalei*, 168, ; *see* Agave americana.
Anaik, 167 ; *see* Agave Vera Cruz.
——-, *Katraghai*, 166 ; *see* Agave Vera Cruz.
——-, *Katrazhai*, 166, 239 ; *see* Agave Vera Cruz.
Anak, 167 ; *see* Agave Vera Cruz.
——- *Kattalai*, 168 ; *see* Agave Vera Cruz.
——- *Kattali*, 168 ; *see* Agave Vera Cruz.
Anakyitha, 168, 219, 239 ; *see* Agave Vera Cruz.
Anana de Agulha, 195 ; *see* Ananas bracteatus.
——— Pite, 163, 168, 177, 201, 221, 247, 255 ; *see* Aloe Yuccae foliis.
Ananas, 168 ; *see* Ananas sativa.
———, bilatee, 175 ; *see* Agave Cantala.
———, Boava, 168, 175 ; *see* Agave Cantala.
——— bracteatus, 193, 195 ; *see* Bromelia Sagenaria.
——— bravo, 168 ; *see* Pandanus sp.
——— Costa, 168, 175 ; *see* Agave Rumphii.
——— Manso, 168 ; *see* Ananas sativa.
——— sativa, 168, 192, 257.
——— sp., 205.
——— sylvestris Brasiliana, 212.
——— utan, 168 ; *see* Agave Cantala.
Ananassa sativa, 158.
Anannas, bilati, 175, *see* Agave Cantala.
Antropogon sp., 251.
Ane, 169 ; *see* Agave americana.
—— *kattale*, 169 ; *see* Agave americana.
Aonas (Pineapple), 251 ; *see* Reda aonas.
Apaches, North American Indian tribe of Northern Mexico, 109, 233.
Apaiba sp., 205.
Aquilaria Agallocha, 70.
Arabia, estimated number of Date palm trees in, 3.

Arbol de las Maravillas, 168; *see* Agave sp.
Arbol Maguey, 168; *see* Agave sp.
Arbor de las Maravillas, 231; *see* Agave sp.
Area, 170; *see* Aloe, Agave or Pandanus sp.
Areca Catechu, 47, 48, 70.
———————, in Mysore, 48.
———————, supposed extract of, 47, 48.
——— nuts, extract of, 47, 48; *see* Areca Catechu.
Aristida spp., brooms made from in America, 235.
Aristolochia sp., 269.
Arnott, G. A. W., 53.
Arruda da Camara, 193; *see* Bromelia Sagenaria.
Artocarpus integrifolia, 210, 214, 215.
———————— spp., 215, 264.
Asclepias tenacissima, 177; *see* Marsdenia tenacissima.
As-sibar, 159; *see* Acibar.
Aublet, J. B. C. F., 94, 175.
Auckland, Lord, 100, 131.
Aucklandia Costus, 21.
Aung, Mg. Shwe Zan, 59, 61.
Averrhoa Carambola, 57.
Azeure, 253; *see* Aloe sp.
Aztecs of Mexico, 271.
Azul, 171; *see* Agave and Aloe spp.
——, 170, 187, 253; *see* Aloe sp.
—— Champahra, 159, 170, 187; *see* Agave americana.

B

Babci, 144, 145; *see* Agave sp.
Bacula, epithet of trees or herbs with fragrant flowers, 171.
Baden-Powell, *see* Powell, B. H. Baden-, 48.
Bael or Bel fruit tree, 70; *see* Aegle Marmelos.
Baesie goddan, 19; *see* Costus speciosus.
Bahamas Hemp, 170, 259; *see* Agave rigida, *var.*
Baillon, H. E., 126.
Bakal, Himalayan birch-bark, 171.
Baker, Mr. J. G., 85, 86, 88, 89, 91-93, 95, 106, 118, 127, 131-134, 138-142, 146, 207, 229.
Bakkul, 170, 171; *see* Agave americana.
Balfour, Bailey, 113.
Balfour, F. G., 171.
Balu rakkisa, 170; *see* Agave americana.
Baluchistan, estimated number of Date palm trees in, 3.
Bamboo, divine (wild), 251; *see* Ram bans.
Banada, Kattala, 170; *see* Agave variegata.
Banians (Hindu traders), 217.
Banks, Sir Joseph, 39.
Bans (Bamboo), 171, 173.
Banskeora, 217, 251; *see* Agave sp.
————, 96, 132; *see* Agave vivipara.
————, 171; *see* Agave Wightii.
———— (1), *see* Agave vivipara, 170.
———— (2), *see* Agave americana. 170.
Bara Kanur, 172, 265; *see* Crinum asiaticum, *var.* toxicaria.
——— *Kanwar*, 172, 209, 219, 261; *see* Agave americana.
——— *Kunvar*, 197; *see* Agave sp.
Barba de Palo, 172, 183; *see* Tillandsia usneoides.
———— Vello, 183; *see* Tillandsia spp.
Barbadoes Aloes, 172; *see* Aloe sp.
Barber, C. A., 57, 86, 88, 91, 92, 147, 155, 253.
Barnard, Major, 207.
Barnardin, 201.
Baron, R., 54.
Bartram, 90.
Bas Kitri, 172; *see* Agave sp.
Basil, common sweet scented, 73; *see* Ocimum basilicum.
Basil, sacred, 73; *see* Ocimum sanctum.
Basivis, 73; *see* Beads.
Baskitri, 173, 261; *see* Agave sp.
Bastard Aloe, 172, 173; *see* Agave Wightii.
——— Tequila, 172, 173, 203, 265; *see* Agave sp.
Basu, 88, 94.
Bates, 225.
Bauhin, Kaspar, 113, 115, 117, 124, 187.
Bauhinia sp., 32.
Baxas, 69; *see* Adhatoda Vasica.
Bead tree, 72; *see* Melia Azedarach.
Beads, 69.
Beans, Goa, 51; *see* Psophocarpus tetragonolobus.

Bear grass, 172, 173; *see* Dasylirion and Yucca spp.
Bedraihe, variety of Dates, in Mesopotamia, 17.
Bel, 35; *see* Aegle Marmelos.
Belati pát, 253; *see* Agave americana.
Belguti, round, applied to a grade of Bengal Cutch, 35.
Beni, C., 225.
Bentham and Hooker, on Agave and Furcraea, 78.
Bentham, G., 54.
Bentley, Professor R., 47.
Berger, M. Al., on Agave sp., 163.
Berhi, variety of Dates, in Mesopotamia, 16.
Bertoloni, A., 107.
Betel-nut palm, 70; *see* Areca Catechu.
Bheels, an aboriginal tribe of Gujarat, 29; *see* Kathodias.
Bhoortha Pharangi, 174; *see* Agave Cantala.
Bhurt, 175; *see* Agave Cantala.
Bhuttala, 174; *see* Agave americana.
Bilangra, 72; *see* Flacourtia Ramontchi.
Bilatee ananas, 175; *see* Agave Cantala.
Bilathe ananas, 174; *see* Agave Cantula, 174.
Bilati ananas, 130; *see* Agave sp.
———— 267; *see* Fourcroya Cantula.
—— *anannas*, 174, 175; *see* Agave Cantala.
—— *pát*, 197; *see* Agave americana.
Bilatte Nanas, 174; *see* Agave Cantula.
Bilaya kand, 19; *see* Costus speciosus.
Billbergia sp., 183, 185; *see* Bromiliacea.
———— speciosa, 187.
———— variegata, 186.
Binder twine for harvesting, 174, 175; *see* Agave sp.
Binnendijk, S., 54.
Birch-bark, 171; *see* Bakal.
Birdwood, Sir George, 36, 55.
"Birm," 179; *see* Agave americana.
Bison horn used in making religious necklaces, 73.
Bitter Aloe, Agaves, formerly classed with, 107.
—— Aloes, 174; *see* Aloe spp.
Black Heart Cutch of Chandbali, Orissa, 26.
Black sugar, 110; *see* Agave sp.
Blanco, M., 53, 221, 239.
Blasquez Ignatio, 247.
Blume, C. L., 48, 175.
Boar tusks used in making religious necklaces, 73.
Bock (Tragus), 112.
Boehmeria nivea, 188.
———— ———— sp., 212.
Boerhaave, H., 113, 118, 119, 127, 241, 243.
Bois Chandelle, 174; *see* Agave foetida.
Bois de Méche, 174, 185, 265; *see* Fourcroya cubensis.
———— ———— tinder or Match tree, 175.
—— Méche, 174; *see* Agave faetida.
"Boistabs," worshippers of Vishnu, 74.
Bojer, W., 163.
Bokul, 171; *see* Mimusops Elengi.
Bombax ceiba, 268.
———- malabaricum, 65.
———-, sp., 205.
Bombay Aloe, Fibre, 133, 138, 175, 176, 177; *see* Agave sp.
———— -, Cutch, 36; *see* Acacia Catechu.
———— ————-, said to consist of four kinds, 36.
———— Hemp, 176; *see* Agave vivipara.
Bomma kachika, 19; *see* Costus speciosus.
Bones, human, used in making religious necklaces, 73.
Bontha Kithanara, 176; *see* Agave Vera Cruz.
Booth, Mr., 195, 199, 233, 239.
Borel, P., 112, 187.
Botor, 52, 57; *see* Psophocarpus tetragonolobus.
——- *kachang*, 57; *see* Psophocarpus tetragonolobus.
Bourgeau, E., 126.
Bouton, L., 169.
Bowstring creeper, 176, 253; *see* Marsdenia tenacissima.
———— -Hemp, 77, 177, 221, 229, 235, 253; *see* Sansevieria sp.
———— -———— (1), 176, 189; *see* Sansevieria Zeylanica.
———— -———— (2), 176; *see* Agave sp.
———— -———— (3), 176, 247; *see* Sansevieria lanuginosa.
———— -———— African, 177; *see* Sansevieria sp.

"Brahm," 179; *see* Agave americana.
Bramarakashie, 178, 249; *see* Agave sp.
Bramha rakasi, 178; *see* Agave americana.
Branthwaite, F. J., 44.
Breon, J. N., 52.
Bromelia acanga, 185; *see* Bromelia Pinguin.
——— argentina, 182.
——— chrysantha, 231.
——— Karatas, 186, 187, 198, 242, 243.
——— Karatis, 255.
——— laciniosa, 222, 223.
——— Pinguin, 184, 185, 188, 199, 205, 213, 235.
——— pita, 178, 179, 213, 233; *see* Bromelia sylvestris.
———, 179; *see* Pita Bromelia.
——— Pite, 255; *see* B. sylvestris.
——— Sagenaria, 192, 198.
——— sp., 183-185, 204, 205, 243.
——— sylvestris, 93, 178, 204-206, 213, 242, 256, 257.
Bromeliaceae, 97, 98, 108, 117, 127, 184, 192, 197, 204, 230, 234, 242, 243, 245, 249, 256, 265-267.
Bromeliaceae, fibre-yielding, not yet sufficiently identified, 98.
Broom corn, 179; *see* Sorghum sp.
——— root, 178, 179, 207, 249, 267; *see* Epicampes macroura.
——— sticks, grasses in Madras from which brushes are made, 179.
"Broom sticks" of Madras Presidency, 235.
Brotero, F., de A., 120.
Brown, R. N., 253.
Browne, Dr. Patrick, 124, 125, 191.
Brush fibre, 179, 207, 221, 249, 263; *see* Agave sp.
——— (1), 178; *see* Agave Cantula, 178.
——— (1 and 2), 265; *see* Agave spp.
——— (2), 178; *see* Agave spp.
——— from Agaveae, 163.
Buch, L. von, 110.
Buchanan-Hamilton, Dr. F., 24, 29, 52, 102, 131, 183, 219, 263; *see* Hamilton, Dr. F. Buchanan.
Buddu Kattale Naru, 180; *see* Agave americana.
Bulbil, 180, 203; *see* Agaveae spp.
———, young plant sprouting from a flower shoot, 247; *see* Agave sp.
Bulbils of Agave said to survive immersion in sea-water, 195.
Burkill, I. H., on Goa Beans in India, 51.
——— on use of Agave raw leaf for tying, 175.
Burmann, J., 114, 127, 136.
Burmese cutch, 32; *see* Acacia Catechu.
Burni, variety of Dates, in Mesopotamia, 17.
Burton, R., 253.
Butler, Dr. E. J., 86, 94, 95.
Butt, 180; *see* Agaveae spp.

C

Cabbage, Agave, 179, 233; *see* Agave sp.
Cabouya, 181; *see* Furcraea gigantea.
Cabuja, 180, 227, 243, 245; *see* Furcraea gigantea.
Cabulla, 181; *see* Furcraea tuberosa.
——— (1), 180, 185; *see* Furcraea tuberosa.
——— (2), 180; *see* Agave sisalana.
Cabuya, 181; *see* Furcraea gigantea and F. tuberosa.
——— 180, 221, 229; *see* Fourcroya tuberosa.
Cactus, 185; *see* Agave spp.
Cæsalpinia Bonducella, 70.
Cæsalpinius; *see* Cæsalpino.
Cæsalpino, A., 111, 112, 117; *see* Cæsalpinius.
Cajete or cavity, 161, 180, 181, 191, 223, 251; *see* Agave spp.
Cajun, 180, 229, 257; *see* Furcraea cubensis.
Calamismis, 57; *see* Psophocarpus tetragonolobus.
California, Lower, estimated number of Date palms in, 3.
Caloncan, 57.
Caloncaw, 52; *see* Psophocarpus tetragonolobus.
Calotropis sp., 269.
Camaluson, 57; *see* Psophocarpus tetragonolobus.
Camerarius, J. I. F., 112, 113, 119.
Cameron, J., 56, 94, 103, 106, 215, 245.
Campbell, 88.
———, Rev. A., 67.
Cane, Aguardiente distilled from molasses, 161; *see* Saccharum.

Canna indica, 70.
Cantala, 131, 132, 219; *see* Agave Cantala.
———-, 211; *see* Aloe vera.
———— (1), 182; *see* Agave?
———— (2), 182; *see* Agave vivipara.
Cantina, 247; *see* Pulqueria.
Canton Hemp, 189; *see* Musa textilis.
————————, 182; *see* Musa troglodytarum textoria.
Cantula, 130, 135, 136, 137; *see* Agave Cantula.
Caraca, 117; *see* Agave sp.
Caragata guacu, 181; *see* Furcraea tuberosa.
Caragata ibera, 183; *see* Bromelia sp.
Caragate, 182; *see* Tillandsia.
Caraguata, 115, 117, 118, 183, 213, 217, 243; *see* Agave sp.
————————, 98; *see* Furcraea tuberosa.
———————— (1), 182, 187, 191, 193, 199, 205, 213, 255; *see* Bromelia argentina.
———————— (2), 182; *see* Fourcroya cubensis.
———————— (I.), 184, 185; *see* Bromelia Pinguin.
———————— (II.), 184; *see* Furcraea tuberosa.
———————— (III.), 184; *see* Aloe sp.
———————— (IV.), 184, 187, 245; *see* Bromelia sp.
———————— (V.), 184, 255; *see* Karatas sp.
———————— *açanga*, 116, 118, 184, 185, 213; *see* Bromelia Pinguin.
———————— *de agua*, 183, 185; *see* Bromelia sp.
———————— *guaçu*, 116, 118, 119, 184, 187; *see* Furcraea tuberosa, 187.
Carambola, 58; *see* Averrhoa Carambola.
Carao, 213; *see* Boehmeria sp.
Carata, 184; *see* Agaveae and Bromeliaceae.
Caratas, 184; *see* Furcraea cubensis.
Caraua, 184; *see* Bromelia sp.
Caravata de Rede, 192; *see* Bromeliaceae?
Cardon, a word applied to certain Euagaves as well as to plants of the Cactus kind, 110, 184-186; *see* Agave.
———- 184, 186; *see* Agave spp.
———- (thistle), 241.
Carey, W., 175.
Caroa, 185, 186, 187, 193; *see* Billbergia variegata.
Caroata, 183, 186, 193, 197, 199, 255; *see* Bromelia Karatas.
———- *Assu*, 185, 186; *see* Fourcroya gigantea and F. cubensis.
Carow, 186, 187, 201, 213, *see* Aloe Yuccae foliis.
Caryota urens, 70.
Cassia Fistula, 32.
Castor oil plant, 8; *see* Ricinus communis.
Cate or cutch, 46; *see* Acacia Catechu.
Catechin, 27; *see* Acacia Catechu.
————--, from Gambier Catechu, 45; *see* Uncaria Gambir.
————--, of Acacia Catechu, 40, 45.
————--, prepared locally, 46.
Catechu and Gambier, the relation between, 45.
————-, Black, 47.
———— in medicine, 47; *see* Acacia Catechu.
————-, nigrum, 47.
————-, or Terra Japonica, 39.
————-, Pale, 47.
———— pallidum, 47.
————-, Red, 24; *see* Acacia Sundra.
————-, 48; *see* Acacia Catechu.
Catecomer, 186, 187, 219; *see* Aloe sp.
Catevala, 169; *see* Agave americana.
————--, 173; *see* Aloe and Agave spp.
————--, 186, 187, 193, 209, 211, 219; *see* Aloe sp.
Cathaulay, 186, 215, 219; *see* Aloe sp.
Cawnpuri cutch, 35; *see* Acacia Catechu.
Cebar, 253; *see* Aloe officinalis.
————--, 186; *see* Aloe spp.
Cebu Hemp, 186; *see* Musa textilis.
Ceiba, 240, 241; *see* Ceiba pentandra.
———- pentandra, 240, 241.
Celosia argentea, 221.
———cristata, 220, 221.
Cement, gilder's or size, said to be made from Mysore Aloes, 237.
Century Plant, 186, 241; *see* Agave americana.
Cerro, name of true oaks in Panama, 187.
Chamaerops humilis, 161; *see* Nannorhops Ritchieana.
———————— Ritchieana, 161; *see* Nannorhops Ritchieana.
Chana makhan khair, 36; *see* Acacia Catechu.
Chandaree, 55, 57; *see* Psophocarpus tetragonolobus.
Chaparay, 186; *see* Agave americana.

Chaparra, a kind of oak, 171; *see* Agave americana.
Charakoni-Sem, 53, 57; *see* Psophocarpus tetragonolobus.
Charputee, 55, 57; *see* Psophocarpus tetragonolobus.
Chatái (mats), 25; *see* Acacia Catechu.
Chauga nara, 186; *see* Sansevieria Zeylanica.
Chauk, square, applied to a grade of Cutch sold in Bengal, 35.
Chaukhabi or *kalagaran*, square, applied to a grade of Cutch sold in Bengal, 35.
Chelem, 143, 145, 188, 195, *see* Agave sp.
Chenna Neyakam, 189; *see* Aloe littoralis.
Chichimecae, 145; *see* Agave sp.
Chilton, John, 109.
China grass, 156, 189; *see* Boehmeria nivea.
——— - (1), 188; *see* Sansevieria Zeylanica.
——— (2), 188; *see* Boehmeria nivea.
Chingar, 201; *see* Agave vivipara.
Chinguirito, 161, 188; *see* Agave americana.
Chini Kalabunda, 188, 209; *see* Aloe littoralis.
Chirayagôd, 19; *see* Costus speciosus.
Chom, 188, 189; *see* Bromelia Pinguin.
Chota Kanwar ka Patta, 188; *see* Aloe littoralis.
Chouca, 188; *see* Agave vivipara.
Chowdari, 55; *see* Psophocarpus tetragonolobus.
Chrysopogon Gryllus, 266.
Chucau, 188; *see* Aloe secunda.
Chucumci, 144, 145, 188, 189; *see* Agave sp.
Chulul-qui, 145; *see* Agave sp.
———, 190, 191; *see* Fourcroya cubensis.
Citamci, 144, 145; *see* Agave sp.
Clarke, C. B., 21.
Clay, beads of white, 73.
Cleghorn, H. F. C., 199.
Clifford, 107.
Clusius, C., 112, 117-119, 126, 127, 130.
Cobblers' thread, 229; *see* Furcraea sp.
Cochlospermum Gossypium, 65, 66, 68.
———, analysis of oil-cake, 66.
———, analysis of seeds, 66.
Cochlospermum Gossypium oil, nature of, 67.
——— seeds, their use as food, 65.
Cocoa-nut palm, 71; *see* Cocos nucifera.
Cocos nucifera, 71, 74.
Cocuy, 190; *see* Agaveae sp.
Cocuyxa, 197; Furcraea gigantea.
Cocuyza, 190, 191; *see* Agaveae sp.
Cogollo, 190, 241; *see* Agave sp.
'———,' the central cone of leaves in certain Agaves, 191.
Coir, a word which signifies simply 'fibre,' 221; *see* Cocos uncifera.
Coix Lachryma-Jobi, 70, 74.
———, *var.* monilifer, 70.
———, *var.* stenocarpa, 70, 71, 74.
———, *var.* typica, 70.
Colebrooke, H. T., 213.
Commelin, Jan and Kaspar, 117, 119, 121, 122, 123, 125, 126.
Cometico, 190; *see* Agave sp.
Cooke, M. C., 21, 67.
Coquis, 223; *see* Agave sp.
Coquise, 190, 191; *see* Agaveae spp.
Corato or *Curaça*, 124; *see* Agave sp.
Coratoe, 183; *see* Bromelia spp.
———, 190; *see* Agave spp.
Coratto, 190, 193; *see* Agave americana.
Corazon, 241; *see* Agave spp.
Cordyline sp., 177, 247.
Cortuso, 111.
Corypha umbraculifera, 71, 74.
Cosson, E. St. C., 126.
Costus, 20, 21; *see* Costus speciosus.
———, Arabian, 21; *see* Costus speciosus.
——— arabicus, 19; *see* Costus speciosus.
——— argyrophyllus, 19; *see* Costus speciosus.
——— sericeus, 19; *see* Costus speciosus.
——— speciosus, 19.
———, root, chemical examination of, 20.
Country Aloe (1) and (2), 193, 215; *see* Aloe spp.
——— fibre, 190; *see* Agave sp.
——— Aloes, 187, 191, 293; *see* Aloe sp.
———, 199; *see* Furcraea cubensis.
——— (1) and (2), 190; *see* Aloe sp.

Cour, 231; *see* Pandanus and Agave spp.
Cowell, Mr., 124.
Coztic Metl, 192, 203, 223, 231; *see* Agave sp.
Crab's eye, 69; *see* Abrus precatorius.
Cravata, 183, 192; *see* Agaveae and Bromeliaceae spp.
——— *de Rede*, 194, 251; *see* Bromelia Sagenaria.
Crin Vegetal (Vegetable Hair), 159, 183; *see* Spanish Moss and Tillandsia recurvata.
Crinum, Anthers of Agave compared with those of, 78.
——— asiaticum, *var.* toxicaria, 172, 261.
——— latifolium, 261.
——— sp., 261.
——— 173; *see* Agave americana.
Cronemeyer, G., 134.
Crotalaria, 177.
——— fibre, 253.
Crowia, 192, 193; *see* Ananas sativa.
Cuba Hemp, 192; *see* Furcraea gigantea, 192.
Culebet, 52, 57; *see* Psophocorpus tetragonolobus.
Cumana, 197.
Cumari, 192; *see* Aloe sp.
———, 209, 219; *see* Aloe sp.
Curaça, 124, 192; *see* Agave sp.
———, 98; *see* Furcraea tuberosa.
Curbatow, 183, 192, 193, 199, 255; *see* Bromelia Sagenaria.
Cushcuttie, 48; *see* Areca Catechu.
Cut, or catechu, 29; *see* Acacia Catechu.
Cutch, 23-49; *see* Acacia Catechu.
Cutch, adulteration of, 44; *see* Acacia Catechu.
Cutch, analyses by Professor Proctor, 40.
——— balls of Padaung, Prome District, 33.
——— boilers of Burma recognise four varieties of Acacia Catechu, 32.
———, Bombay, 36; *see* Acacia Catechu.
———, Burma, varieties of, black, yellow, red, 33.
———, Cawnpuri, 35; *see* Acacia Catechu.
———, *chana makhan khair*, 36; *see* Acacia Catechu.
Cutch, chemistry of, 39-43.
———, commercial grades of, 40, 42; *see* Acacia Catechu.
——— made in Assam, 27; in Bengal, 24, 25; in Bombay, 29, 30; in Burma, 31; in Central Provinces, 27, 28; in Chutia Nagpur, 25; in Madras, 30, 31; in Nepal, 25; in Orissa, 26; in United Provinces, 28; *see* Acacia Catechu.
———, manufacture in Gujerat, destructive nature of, 30.
———, manufacture of, 33, 34.
———, markets in Burma, 32, 33.
———, pale, of the United Provinces and Kumaon, 35; *see* Acacia Catechu.
———, Pegu, 34; *see* Acacia Catechu.
———, trade in, 49; *see* Acacia Catechu.
———, trees which yield, 23, 24.
———, yellow, of Pegu, 35; *see* Acacia Catechu.
———, yield of, 34; *see* Acacia Catechu.
Cuthala nar, a little known Madras fibre, 191, 192, 247.
Cutta-camboo, 43; *see* Areca Catechu.
Cuttalay, 192; *see* Agave sp.
———, 255; *see* Fourcroya gigantea.
——— *nar*, 192; *see* Agave sp.
Cymbals, Turkish or Kettledrum, 109; *see* Zambur.

D

Dagger plant, 192, 261; *see* Yucca gloriosa.
Dalzell, N. A., 88, 92, 137.
Danielli, J., 109, 111, 112, 121, 261, 271.
Dara-Dambala, 55, 57; *see* Psophocarpus tetragonolobus.
Dasylirion, sp., 98, 173, 237.
Date growing regions, humidity and rainfall in, 4.
——— palm, 1; *see* Phœnix dactylifera.
———, best varieties, 15.
———, climatic conditions required for, 3.

Date palm cultivation, germination of seed, 5.
——————— irrigation required, 5, 10-12.
——————— of, 2.
———————, soil required, 5, 6.
——————— distribution of, 2.
——————— experimental cultivation of, 3.
——————— fertilisation of, 7, 12-14.
——————— growth in Alkali soil, 7.
——————— how propagated, 7.
——————— in relation to sunshine and temperature, 5.
——————— pollination of, 7, 12-14.
——————— sex of flowers in, 2.
——————— tolerance of salinity of, 5.
——————— palms in existence (exclusive of India), 3.
Date producing regions, temperature of, 6.
Dates, varieties of, Dry, Medium, Soft, 15.
Datura sp., 98.
Datura Stramonium, 98, 239.
Davy, Sir Humphry, 39, 40.
DeCandolle, A., 52, 95, 99.
De Flacourt, 247.
Deglet Noor, variety of Dates, in Algeria, 16.
De Laet, 115, 187, 189, 239, 263.
De Lecluse, C. (Clusius), 111, 159, 195.
——————— on Aloe spp., 159, 195.
Deppe, 100, 129; *see* Schiede and Deppe.
Descourtilz, M. E., 125.
Desfontaines, R. L., 126.
Desi, native, applied to certain Agave plants, 102.
Desvaux, A. N., 53.
Dey, Surendra Nath, on the seeds and oil of Cochlospermum Gossypium, 65.
Dhenki, 24; *see* Acacia Catechu.
Djaat, 54, 57; *see* Psophocarpus tetragonolobus.
——— *monjet*, 54; *see* Psophocarpus tetragonolobus.
——— *Putoi*, 54; *see* Psophocarpus tetragonolobus.
Dieterich, K., 45, 46.
Dietrich, F. G., 267.
Dillwyn, L. W., 122.
Dipterocarpus tuberculatus, leaves employed for wrapping cutch, 34.
Divine (wild) bamboo, 251; *see* Ram bans.
Dodge, C. R., 93, 142, 146, 156, 181, 201, 207, 217, 235, 241, 247, 249, 253.
Dodoens, R., 107.
Dolichos Lablab, 57.
Dolichos ovatus, 53; *see* Psophocarpus tetragonolobus.
——— suffultus, 53.
——— tetragonolobus, 52; *see* Psophocarpus tetragonolobus.
Drummond, J. R., 92.
——————— and Colonel D. Prain on Agave and Furcraea in India, 77.
Drury, Colonel H., 138.
Dunstan, Professor Wyndham R., 44, 65.
Du Petit-Thouars, I. M. A., 52.
Du Tertre, 117, 245.
Duthie, J. F., 92.

E

Eagle wood, 70; *see* Aquilaria Agallocha.
Edwards, 165, 227, 239.
——— on Philippine Agaves grown for fibre, 165.
——— on tying of Tobacco with Agave leaf in the Philippines, 175.
Egypt, estimated number of Date palm trees in, 3.
Elaeocarpus Ganitrus, 71, 72, 74.
——————— lanceolatus, 72.
——————— tuberculatus, 72.
Elephant Agave, 192; *see* Agave Vera Cruz.
——— Aloe, 169; *see* Agave americana.
——— tusks used in making religious necklaces, 73.
El Maguey, 161, 165; *see* Allaguey, also Agave sp.
Embira, 205; *see* Funifera sp.
Enequen, 194; *see* Agave or Furcraea sp.
Engelmann, G., 78, 82, 94, 99, 141-143, 145, 146, 189, 199, 203, 207, 209, 259.
——————— *see* Schott and Engelmann, 90.
Entada scandens, 72.
Enuga kalabanda, 269; *see* Agave Vera Cruz.

Enuga kalabantha, 194; *see* Agave Vera Cruz.
——— *kalabonda*, 194; *see* Agave Vera Cruz.
——— *kalabunda*, 194; *see* Agave Vera Cruz.
Epicampes macroura, 178, 234, 250.
Epicampes sp., 179.
Erikatali, 194; *see* Agave vivipara.
Eriodendron anfractuosum, 65.
Ernst, Dr. A., 197, 199.
Erva babosa, 197; *see* Aloe vera.
——— 197; *see* Sansevieria sp.
Espadillo, perhaps a version of the Mexican Ixtle, which *see*, 195.
——— 194, 195; *see* Agave spp.?
Euagave, 77-82, 93, 94, 98-102, 112, 115, 118, 122-128, 133, 143, 221, 229-233, 247, 249, 265.
———, 171; *see* Agave americana.
——— and Furcraea, 80, 90.
——— butt of the plant, 181.
——— fibre, 179.
——— sp., 265.
———, varieties, 167.
Euagaves, 90, 97, 122, 132, 133, 139, 147, 261.
Euonymus grandiflorus, 72.
Eve's thread, 195; *see* Yucca filamentosa.

F

Falconer, Dr. H., 21.
False sisal, 77, 78, 93, 106, 141, 146, 194; *see* Agave decipiens.
Famine foods, 19, 20; *see* Costus speciosus, root.
Fan palm of South India, 71; *see* Corypha umbraculifera.
Fard, variety of Dates, in Arabia, 16.
Faringi, 175; *see* Agave Cantala.
Fasio, M. F., 201.
Fava de Cavallo, 57; *see* Psophocarpus tetragonolobus.
Fayal Lace, 194; *see* Agave americana.
Fever nut, The, 70; *see* Cæsalpinia Bonducella.
Fibre Aloe, 99.
Ficus glomerata, 72.
Fiddles made from the central shoot of Agave plant, 109.
Filo de pita, 194; *see* Agave americana.
Fily Agulla, 161; *see* Agave Vera Cruz.
——— *Agulha*, 194; *see* Aloe americana.
Fique, 196; *see* Furcraea gigantea.
Fire-water, or brandy, 98, 161; *see* Aguardeinte.
Fish plant, 161; *see* Nannorhops Ritchieana.
Fitch, 197.
Flacourt, Governor of Madagascar in 17th Century, 221.
Flacourtia Ramontchi, 72.
Flax, common, 72; *see* Linum usitatissimum.
Fletcher, F., on Date palm cultivation, 1.
"Floss" or tow from Agave plants, 97; *see* Silk grass.
Food, famine, 243; *see* Agave sp.
——— stuffs, 19, 20; *see* Costus speciosus.
"Foreign pineapple," 237; *see* Agave Rumphii.
Forskohl, P., 217, 253.
Fortescue, Dr. A. Irvine, 94, 100.
Fourcroya; *see* also Furcraea.
Fourcroya Cantala, 88.
——— Cantula, 130, 174, 252, 253, 256.
——— cubensis, 174, 182, 186, 190, 191, 198.
——— foetida, 240, 241.
——— gigantea, 186, 198, 254.
——— tuberosa, 130, 180.
Fragoso, J., 161.
French beans, substitute for, 53; *see* Psophocarpus tetragonolobus.
——— whisk fibre, 179; *see* Epicampes sp.
Fries, T. M., 107.
Funifera sp., 204, 205.
Furcraea, 105, 117, 132, 146, 147, 165, 167, 245, 266.
———, 175; *see* Agave foetida.
——— Commelynii, 95, 147.
——— = Aloe americana tuberosa minor, 128.
——— cubensis, 125, 180-187, 191, 193, 220, 225, 226, 229-231, 238, 239, 256, 257, 262, 264.
——— = Agave cubensis, 128.
———, mexicana, 128.
——— foetida, 137.
———, general description of, 78-82.

Furcraea gigantea, 95, 116, 121, 128, 131, 147, 162, 180-183, 192, 196, 197, 200, 201, 229, 241, 244, 254, 256.
———— 175; *see* Agave foetida.
———— of De Candolle, 95.
———— longaeva, 102.
———— madagascariensis, 247.
———— odorata, 125.
———— Selloa, 94.
———— sp., 77, 99, 124-134, 160, 164, 167, 175, 181, 185, 194, 198, 202, 213, 217, 223, 226, 231, 239-247, 254, 259, 265.
———— (1), 94, 95.
———— (2), 95.
———— (?), 169; *see* Aloe Yuccae foliis, also Bromelia sp.
———— tuberosa, 98, 118, 129, 131, 180-187, 191, 199, 236.
———— ———— = Agave tuberosa, 128.
————, 175; *see* Agave foetida.
Furcraeas, 90, 97, 102, 249.

G

Gaitskell, A., 56.
Gala khair, 46; *see* Acacia Catechu.
Galeotti, 88.
Galuano, A., 110, 113.
Gambier, analyses of, 46; *see* Uncaria Gambir.
———— and Catechu, the relation between, 45.
————, the cube Catechu of commerce, 36.
————, trade in, 49; *see* Uncaria Gambir.
Gamble, J. S., 65, 67, 89, 133, 137, 233, 265.
Garcia, early writer, 231.
Garlic, 70; *see* Allium sativum.
Gartenwelt (The), 163.
Gata khair, 36; *see* Gambier.
Gawler, J. B., 86, 87, 127, 139, 140.
Getah Tarap, 265; *see* Agave Kunstleri.
Ghaipat, 196; *see* Yucca gloriosa.
Ghars, variety of Dates in Algeria, 16.
Ghaymari, 196; *see* Agave vivipara.
Ghee Koomar, 196; *see* Aloe spp.
Ghevda, 57; *see* Psophocarpus tetragonolobus, also Dolichos Lablab.
Ghi Kunvar, 196; *see* Aloe vera.
Ghikomar, 217; *see* Aloe vera.
Ghikwar, 196; *see* Aloe perfoliata.
Ghrita Kumari, 196, 197; *see* Aloe spp.
Giant fibre lily, 196; *see* Furcraea gigantea.
Gibson, 137; *see* Dalzell and Gibson.
Gmelin, P. F., 267.
Goa bean, 51; *see* Psophocarpus tetragonolobus.
————, analysis of root, 64.
———— seed, 64.
————, cost of cultivation in Burma, 60.
————, extent of cultivation in Burma, 63.
Gôd, 19; *see* Costus speciosus.
Gollan, W., 55, 101, 132, 133.
Gomara, F. Lopez de, 110, 111.
Gondaïla, variety of Dates in Egypt, 17.
Gooti, 36; *see* Gambier.
Gora khair, 36; *see* Acacia Catechu.
Graham, J., 53, 130, 132, 133, 137, 138.
————, Professor R., 53.
Grandidier, A., 54.
Grant, Captain J. A., 54.
Grass Hemp, 196; *see* Agave rigida.
————shoes, 161; *see* Nannorhops Ritchieana.
—— silk, 196, 201, 257; *see* Aloe Yuccae foliis.
————, 197, 201; *see* Bromelia sp.
Gratte, a scutching machine, 196.
Gratteuse, a scutching machine, 196.
Gravata, 198, 255; *see* Bromelia Karatas.
Grawatha, 198, 255; *see* Bromelia Sagenaria.
————, 183; *see* Bromelia spp.
Great Aloe, 198, 259; *see* Fourcroya gigantea.
—— American Aloes, 191; *see* Fourcroya cubensis.
———— (1), 198; *see* Agave americana.
———— (2), 198; *see* Fourcroya cubensis.

Green Aloe, 165, 198; *see* Agave vivipara.
——— 257; *see* Furcraea sp.
—— Aloes, 199; *see* Aloe sp.
Greshoff, M., 43, 46.
Grey Aloe, 198; *see* Agave Vera Cruz.
———, 199; *see* Furcraea cubensis.
Griffith, W., 161.
Grisebach, A. H. R., 124, 125, 142.
Gritha Kumari, 209; *see* Aloe spp.
Guadua Tagoara, 263; *see* Aloe Yuccae foliis.
Guafila, 198; *see* Agave falcata.
Guama, 199; *see* Lonchocarpus sp.
Guamara, 198; *see* Karatas Plumieri.
Guilfoyle, Dr. W. R., 197, 235.
Guillemin, A., 53.
Gul Shabo, 198; *see* Agave Cantala.
Gular, The, 72; *see* Ficus glomerata.
Gulshabbo, 199; *see* Polianthes tuberosa.
Gyrocarpus Jacquini, 72.

H

Haemodoraceae, 77.
Hamilton, Dr. F. Buchanan-, 24, 29, 36.
Hampe, flowering stem of Agaveae, 198.
———, 247; *see* Agave sp.
Hanbury, Sir Thomas, 119, 134, 135.
Hane-a-Cane, 198; *see* Agave and Furcraea spp.
Hariot, 197.
Harvey, Mr. J. C., 93.
Hasskarl, J. C., 53, 54, 134, 135, 237.
Hathi chingar, 200; *see* Agave vivipara.
——— *sengar*, 200; *see* Agave americana.
Hawkes, 101, 110, 131, 141, 257.
Hayani, variety of Dates, in Egypt, 17.
Hayti Hemp, 181, 200, 201, 229, 245; *see* Furcraea gigantea.
Hedge Aloe, 237; *see* Agave sp., also Aloe.
———, 199; *see* Furcraea cubensis.
——— (1), 200, 267; *see* Agave sp.
——— (2), 200, 267; *see* Aloe barbadensis.
Helwi, variety of Dates, in Mesopotamia, 16.
Hemsley, Mr. W. B., 108, 129, 245.
Hemp, African Bowstring, 159, 177; *see* Sansevieria.
Hemp, Canton, 189; *see* Musa textilis.
Henechen, 200; *see* Aloe Yuccae foliis.
Henequen, 98, 197, 201, 203, 209.
———, 231; *see* Agave and Yucca spp.
———, 195; *see* Agave, Aloe and Yucca spp.
———, 179, 197, 201, 203, 249; *see* Agave sisalana.
———, 97, 117, 144, 145, 243; *see* 1, Agave sp.
———, 245, 265; *see* Aloe Yuccae foliis.
——— (1), 200, 221, 255; *see* Aloe Yuccae foliis.
——— (2), 200, 203, 221; *see* Agaveae spp.
——— (3), 203; *see* Agave sisalana.
———, 200; *see* Agave sisalana, Perrine, and connected spp.
——— (4), 202; *see* Yucca filamentosa.
——— Hemp, 202; *see* Agave sisalana.
———, one of the fibre-yielding plants of the West Indies, 109; *see* Agave sp.
———, wild, 195; *see* Agave sp.
Hennequen, 202; *see* Agave and Furcaera sp.
Hennequin, 202; *see* Agave sisalana.
Hennequinitos, 202; *see* Agave sisalana.
Herba spiralis hirsuta, 19; *see* Costus speciosus.
Hermann, Prof. P., 115, 116, 118, 122-125, 127, 203, 213, 243.
Hern, Dr., 135.
Hernandez, F., 98, 108, 109, 115, 116, 118, 122, 127, 138, 143, 145, 197, 203, 213, 223, 233, 237, 239, 249, 263, 265, 271.
Hevesi, variety of Dates, in Mesopotamia, 16.
Heyne, B., 48.
Hibiscus, 177.
——— cannabina, 247.
——— fibre, 253.
Hill, J., 92.
Hill Aloe, 202; *see* Agave Wightii.
———, 199; *see* Furcraea cubensis.
—— palm, 70; *see* Caryota urens.
Hoffmann, H., 100.
Hog plum, 73; *see* Spondias mangifera.
Honduras Silk Grass, 179; *see* Bromelia sylvestris.
Honey, 110; *see* Agave sp.

Honey, Tree, 231; *see* Agave sp.
———, Metl, 110; *see* Agave sp.
Hooker, Sir W., 100, 140.
———, on Agave and Furcraea, 78.
Hooper, D., on composition and trade forms of Indian Cutch, 23.
———, on composition of Goa Beans, 64.
———, on the root of Costus speciosus as a food stuff, 19.
Hope, C. G., 201.
Hto-pong, 57; *see* Psophocarpus tetragonolobus.
Huci Metl, 202; *see* Agave sp.
Huila, 173, 202, 263, 265; *see* Agave sp.
Humboldt, F. H. A. Baron von, 108, 109, 111, 140, 205, 223.
Hummel, Prof. J. J., 44.
Hunter, Dr., 211.
Hyangah, 44; *see* Terminalia Chebula.

I

Ibera, 183, 187, 204, 243; *see* Bromelia sp.
——, 205; *see* Funifera sp.
Ibrimi, variety of Dates, in Egypt, 17.
Im Thurn, E. F., 193.
Imbira branca, 204, 205; *see* Funifera sp.
Incense, 21; *see* Costus.
Indian Shot, 70; *see* Canna indica.
Irvine, Dr. R. H., 20.
Istale, 204; *see* Bromelia sylvestris.
Istle, 144, 145; *see* Agave Istle.
——, 179, 233, 263, 269; *see* Bromelia sp.
——, 183, 187, 199, 205; *see* Bromelia sylvestris.
——, 249; *see* Karatas Plumieri.
——, 98; *see* Tampico fibre.
—— (1), 243; *see* Bromelia sp.
——— 204, 209, 229; *see* Bromelia sylvestris.
——— and (2), 223, 255; *see* Bromelia sylvestris.
—— (2), 204; *see* Bromelia sylvestris.
Ito, T., 54.
Itzle, 205; *see* Bromelia sp.
Ixtilioides, 135, 141; *see* Agave ixtilioides.
Ixtilli, 205, 206, 207, 209, 241; *see* Agave sp.
Ixtle, 179; *see* Agave and Bromelia spp.
——, 205, 207, 209; *see* Agave Bromelia and Nidularium sp.
——, 195; *see* Agave sp.
——, 189; *see* Bromelia sylvestris.
——, 233; *see* Nidularium Karatas.
—— (1), 206; *see* Bromelia sylvestris.
—— (2), 206; *see* Nidularium Karatas.
—— (1), (2), 255; *see* Bromelia sylvestris.
—— (3), 179, 205, 206; *see* Agave sp.
—— Mescal, 206; *see* Agave Wislizeni.
—— of British Honduras, 263; *see* Bromelia sp.
Ixtli, 135, 144; *see* Agave Ixtli.
——, 189, 249; *see* Karatas Plumieri.
——, 98, 99; *see* Tampico fibre.
—— (1), 255; *see* Bromelia sylvestris.
—— (1), 206; *see* Karatas Plumieri.
——(2), 206; *see* Agave Ixtle.
Ixtly, or ixtle, 208.
——, 141; *see* Agave ixtly.

J

Jack fruit, 215; *see* Artocarpus integrifolia.
Jacobi, G. A., 141, 144, 259.
Jacquin, N. J. Baron von, 87, 95, 122, 126, 127, 139, 140, 147, 223, 239.
Jafirabad Aloes, 208; *see* Aloe sp.
Jamaica Keratto, 208; *see* Agave Morrisii.
Jambho, 8; *see* Eruca sativa.
Jameson, Dr. W., 132.
Janakpuri Cutch, 25, 26, 38, 46; *see* Acacia Catechu.
——— *khair*, 35, 46; *see* Acacia Catechu.
Jangli ananas, 208; *see* Agave americana.
——— *anás*, 208; *see* Agave americana.
——— *haldi*, 19; *see* Costus speciosus.
——— *Kunvara*, 208; *see* Agave americana.
Jeeni Kathalai, 208; *see* Agave Vera Cruz, Mill.
—— *Kattalai*, 189; *see* Agave Vera Cruz.

Jenequen, 144; *see* Agave sp.
———, 208, 209; *see* Agave sp.
Jessart, 44.
Jetee, 177; *see* Marsdenia tenacissima.
Jiti, 177; *see* Marsdenia tenacissima.
—— bast, 229; *see* Marsdenia sp.
Job's Tears, 70; *see* Coix Lachryma-Jobi.
Johnson, Miss G. E., 142.
Jones, Sir W., 183, 213.
Joti, 73; *see* Putranjiva Roxburghii.
Jungli, 208; *see* Agave americana.
——— *ananas*, 209; *see* Agave americana.

K

Kachang Botol or *Kachang Botor*, 57; *see* Psophocarpus tetragonolobus.
Kadanaku, 167, 187, 208, 211; *see* Aloe sp.
Kadhi (Qazi), 209; *see* Aloe sp.
Kadi, 208, 221; *see* Keura odorifera.
—— (Cadi), 209; *see* Aloe sp.
Kai kanda, 19; *see* Costus speciosus.
Kala Kantala, 210; *see* Agave americana.
Kalabanda, 219; *see* Agave sp.
———, (1) 208; *see* Aloe vera.
———, (2) 208; *see* Agave Vera Cruz.
Kalabantha, 208; *see* Agave americana.
Kalabonda, 208; *see* Agave Vera Cruz, Mill.
Kalabunda, 210; *see* Aloe sp.
Kalabuntha, 177, 210, 211, 241; *see* Aloe perfoliata.
Kalamanda, 219, 235; *see* Agave sp.
Kalbanda, 209, 210, 211; *see* Aloe perfoliata.
Kalkali, 210, 211; *see* Aloe perfoliata.
Kalnan, 210; *see* Agave sp.
Kalnar, 210; *see* Agave sp.
Kan, 210; *see* Agave rigida.
Kand, 239; *see* Agave sp.
Kanora, 217; *see* Agave sp.
Kanta, 239; *see* Agave sp.
——— (thorn), 251; *see* Ramkanta.
Kantal, 183, 210, 215, 265; *see* Artocarpus integrifolia.
Kantala, 130; *see* Agave Cantala.
———, 169, 173; *see* Agave spp.
———, 213; *see* Agave vivipara.
———, 183, 210, 219; *see* Aloe vera.
——— (1), 212; *see* Agave Kuntala.
Kantala, (2), 212; *see* Agave vivipara.
———, (3), 212; *see* Agave Vera Cruz.
Kanur, 217; *see* Agave sp.
Kanwar, 173; *see* Agave americana.
———, 189; *see* Aloe sp., also Agave sp.
Kapa-jakka, 215; *see* Ananas sativa.
Kapok, from Cochlospermum Gossypium, 65.
Karao, 212; *see* Boehmeria sp.
Karaoata, 212, 255; *see* Ananas sylvestris Brasiliana.
Karata, 212; *see* Ananas sylvestris Brasiliana.
———, 183; *see* Bromelia spp.
——— *Sauvage*, 212; *see* Aloe Yuccae foliis.
Karatas, 183; *see* Bromelia sp.
——— Plumieri, 185, 187, 198, 205, 206, 213, 223, 243, 249, 255, 257.
——— sp., 183, 184.
Karato, 98; *see* Furcraea tuberosa.
Karens, in Burma grow Psophocarpus, 58.
Karinghota, 73; *see* Samadera indica.
Karoon Kuttalay Nar, 214; *see* Agave sp.
Karun Kathali, 214; *see* Agave Vera Cruz.
——— *Kattalai*, 214; *see* Agave Vera Cruz.
Karwinski, Baron, 82, 93, 98, 100, 106, 139, 141, 142, 144, 146, 189, 195, 207.
Kassu, 48; *see* Acacia Catechu.
———, 48; *see* Areca Catechu.
Kat, 23; *see* Acacia Catechu.
Katar, 214, 215; *see* Artocarpus integrifolia.
Kath, 23, 25, 28-30; *see* Acacia Catechu.
———, 215; *see* Artocarpus integrifolia.
Katha, 23, 28; *see* Acacia Catechu.
——— *suffaid*, 37; *see* Acacia Catechu.
Kathail, 215; *see* Artocarpus integrifolia.
Kathair, 215; *see* Artocarpus integrifolia.
Kathal, 183, 211, 214, 215, 265 *see* Artocarpus integrifolia.
Kathalai, 214; *see* Agave americana.
Kathalay, 214, 217, 219; *see* Agave vivipara.
Kathali, 214, 215, 217; *see* Agave Vera Cruz.

Kathodias, an aboriginal tribe of Gujarat who manufacture Kath or Catechu, 29, 30; *see* Acacia Catechu.
Kattal, 214; *see* Kathal.
Kattala, 214, 215; *see* Agave Vera Cruz.
Kattalay, 214, 215, 217; *see* Aloe perfoliata.
——— *Nar*, 229; *see* Aloe perfoliata.
———, 229; *see* Sansevieria sp.
Kattale, 169; *see* Agave americana.
———, 193; *see* Agave sp.
——— (Aloe), 181; *see* Agave americana.
Kattali, 191, 193, 214, 215, 221; *see* Agave americana.
———, 219, 221, 257; *see* Agave sp.
——— fibre, 216; *see* Agave sp.
Kattaly, 216; *see* Agave sp.
Kaw Bemya, 57; *see* Psophocarpus tetragonolobus.
Kaya khair, 36; *see* Acacia Catechu.
Kea, 216, 217; *see* Pandanus odoratissimus.
——— *Kanta*, 216; *see* Pandanus foetidus.
Kedanaku, 189; *see* Aloe sp.
Kekel, 217; *see* Pandanus odoratissimus.
Keker, 217; *see* Pandanus odoratissimus.
Kemuka, 19; *see* Costus speciosus.
Kenda, 173, 209, 216, 239; *see* Pandanus odoratissimus.
Keoli, 19; *see* Costus speciosus.
Keoo kanda, 19; *see* Costus speciosus.
Keora, 173; *see* Agave americana.
———, 221 *see* Pandanus odoratissimus.
———, screwpine, 171; *see* Pandanus.
Keorkanta, 217; *see* Pandanus foetidus.
Keratto, 117; 183, 191, 193, 209, 216, 261; *see* Agave sp.
———, 183; *see* Bromelia spp.
Kes-kand, 19; *see* Costus speciosus.
Ketaki, 216, 217; *see* Pandanus odoratissimus.
Ketgi, 217; *see* Pandanus odoratissimus.
——— (1), 216; *see* Pandanus odoratissimus.
——— (2), 216; *see* Agave americana.
Ketki, 219; *see* Agave Cantala.
———, 216, 217; *see* Pandanus odoratissimus.
Kettledrum or Turkish Cymbals, Zambur, 109.
Ketukee, 216, 217; *see* Pandanus odoratissimus.
Keu, 19; *see* Costus speciosus.
Keura, 216, 217, 221; *see* Pandanus odoratissimus.
Keura, 231; *see* Pandanus and Agave spp.
Keura odorifera, 208.
Keurkanta, 216; *see* Pandanus odoratissimus.
Kewa, 19; *see* Costus speciosus.
Keya, 217; *see* Pandanus odoratissimus.
Khadrawi, variety of Dates in Mesopotamia, 16.
Khair, 23-29, 50; *see* Acacia Catechu.
———, *chana makhan*, 36; *see* Acacia Catechu.
———, dark coloured Catechu of Bengal, 24.
———, *gala*, 46; *see* Acacia Catechu.
———, *gata* or *gooti*, 36; *see* Gambier.
———, *gora*, 36; *see* Acacia Catechu.
———, *Janakpuri*, 35, 46; *see* Acacia Catechu.
———, *kaya*, 36; *see* Acacia Catechu.
———, *papri*, 36; *see* Gambier.
———, 46; *see Papri khair*.
——— *tela* or *tele*, 35; *see* Acacia Catechu.
Khairas, aborigines who manufacture Cutch, 26, 28.
Khairias, a class of Doms in the United Provinces who manufacture Kuth or Cutch, 28.
Khairwas, professional cutch boilers of Damoh, C. P., 28.
Khalasi, variety of Dates, in Arabia, 16.
Khassab, variety of Dates, in Arabia, 17.
Khetki, 216; *see* Agave vivipara.
Kia, 215; *see* Pandanus odoratissimus.
—— *kandia*, 19; *see* Costus speciosus.
Kiakanta, 173; *see* Agave americana.
Kikanora Matha, 216; *see* Agave Vera Cruz.
King, Sir George, 96.
Kirk, Sir John, 54.
Kithali Nara Matha, 218; *see* Agave Cantala.
Kithanara, 177, 218, 219; *see* Agave Cantala.
Kitki, 218; *see* Agave Cantala.
Kitta Nar, 218; *see* Agave sp.
Kittanara, 218; *see* Agave Cantala.
——— *Mattalu*, 218; *see* Agave Vera Cruz.
Kittaulee Nar, 218; *see* Agave sp.
Klamanda, 209, 211; *see* Agave sp., also Aloe perfoliata.
Klamanda, 218; *see* Agave sp.
Klotzsch, J. F., 143.
Koch, K. H. E., 141.

Koomaree, 218; *see* Aloe spp.
Koot, 19; *see* Costus speciosus.
Kossa, 48; *see* Areca Catechu.
Kostanacki Tambir, 45.
Koyan, 217, 218; *see* Agave americana.
Krembs, 45.
Krowa, 193; *see* Ananas sativa.
Kuar Gandal, 220; *see* Aloe indica.
Kudubis, a jungle tribe of Goa origin who manufacture catechu in the south Kanara District, 31.
Kumaon Cutch, 24, 46; *see* Acacia Catechu.
Kumara, 219; *see* Agave Cantala.
Kumari, 219; *see* Agave sp.
Kuntala, 183, 211, 218; *see* Agave Cantala.
Kunth, C. S., 84, 93, 127, 128, 141, 143, 223.
Kunvar, 209, 217, 218; *see* Aloe sp.
Kunwar, 173, 187, 197, 221; *see* Aloe sp.
Kurz, Dr. W., 88.
Kust, 21; *see* Costus speciosus.
Kustawi, variety of Dates, in Mesopotamia, 17.
Kut, 21; *see* Costus speciosus.
Kuttalay, 219; *see* Aloe perfoliata.
———, 218, 257; *see* Aloe sp.
Kutthalai, 220; *see* Aloe sp.
Kuvara, 219; *see* Agave Cantala.
Kwar Gandal, 197; *see* Aloe perfoliata, 197.
Kyre, 169, 220, 221, 231; *see* Agave vivipara.
——, 231; *see* Pandanus and Agave spp.
Kyôla, 19; *see* Costus speciosus.

L

Labat, L., 175.
La Cabuja, one of the fibre-yielding plants of the West Indies, 109; *see* Agave sp.
Laervis, 135; *see* Agave laevis.
Laffa, 169 177, 220, 247; *see* Aloe Yuccae foliis.
Lagerstroemia Flos-reginae, as an adulterant of cutch, 44.
Lakar-sem, 57; *see* Psophocarpus tetragonolobus.
Lal khair, 24; *see* Acacia Sundra.
Lal mati (red earth), 36.
Lal murga, 220, 221; *see* Celosia cristata.
Lamarck, J. B. A. P. M., 101, 125, 127, 147, 247.
Lane, E. W., 253.
Langue Boeuf, 220; *see* Furcræa cubensis.
Large Aloe, 259; *see* Agave sp.
—— ——— fibre, 220; *see* Agave sp.
Latham, Mr. H. A., 31.
Leather, Dr. J. Walter, Experiments with cutch, 34.
Lecheguilla, or 'Cabbage' Agaves, the main source of Tampico fibre, 179.
——— 220, 221; *see* Agave sp.
Lecluse, Charles de, 111, 112, 122.
Lecythis sp., 205.
Lein, 44; *see* Terminalia bialata.
Lemaire, C., 205.
Leopold, 94.
Leries, Father, 94.
Letka, or retail dealers in Burma, 61.
Lida Boaya (Crocodile's tongue) 220, 221; *see* Aloe sp.
Lidah Boaya, 114, 130; *see* Aloe vera.
Lidang boaya, 221; *see* Aloe sp.
Lilac, Persian, 72; *see* Melia Azedarach.
Lilium, Anthers of Agave compared with those of, 78.
Lily fibre, 220, 233; *see* Agave americana.
Lindgreen, 88.
Linnaeus, 52, 88, 92, 99, 107, 118-124, 147.
Linné, C. von; *see* Linnaeus.
Linschoten, J. H. van, 113, 187.
Linum usitatissimum, 72.
Liotard, L. 171, 173.
Lisboa, J. C., 55.
Littaea geminiflora, 132.
———, group of Agaves, 167.
———, section of Agave, 221.
Lobus, quadrangularis, 52; *see* Psophocarpus tetragonolobus.
Lolisaragida, 215; *see* Aloe littoralis.
Long Aloe, 255; *see* Agave spp.
———, 191; *see* Agave vivipara.
———, 199; *see* Furcraea cubensis.
——— (1), 222; *see* Agave sp.
———, (2), 222; *see* Agave vivipara.
Longifolia, 143; *see* Agave longifolia.
Lotus, sacred, 72; *see* Nelumbium speciosum.
Loureiro, J., 52.
Lumholtz, C., 98.

M

Mabala, 54; *see* Psophocarpus tetragonolobus.
McCann, Dr. H. W., 25.
Macembira, 205, 222; *see* Bromelia laciniosa.
Mackintosh, Major, 36.
M'Leod, General, H., on American Aloe fibre for brushes, 163.
Macoztic Metl, 193, 222; *see* Agave sp.
Macrae, J., 30.
Madden, Major, E., 28.
Madre Pulque, 222; *see* Agave atrovirens.
Magay, 222; *see* Agave sp.
Maguay, 222; *see* Agave americana.
——— *de Cocuy*, 191, 222; *see* Yucca acaulis.
Maguay de Cocuyz 222; *see* Yucca acaulis.
Mague, 222; *see* Agave spp.
Maguei, 222; *see* Agave cubensis.
———, or *maguey*, 109; *see* Agave sp.
——— *or Manguai*, 97; *see* Agave sp.
Magueis, 110, 222, 227; *see* Agave sp.
Magueiz, 110; *see* Agave sp.
Maguey, 108, 118, 125, 169, 189, 223-233, 239, 247; *see* Agave sp.
——— (1), 224; *see* Agave vivipara.
——— (2), 224, 249; *see* Agave americana.
——— (3), 224; *see* Agave sp.
——— (4), 224, 245; *see* Agave mexicana.
——— *Blando*, 224; *see* Agave Salmiana.
———, called Honey Tree, 231; *see* Agave sp.
——— *cimarron*, 129; *see* Agave sp.
———, 224; *see* Agave americana.
——— *de Tequila*, 224; *see* Agave americana.
——— *divinum*, 122; *see* Agave sp.
——— *Manso*, 224, *see* Agave Maximilianea.
——— *fino*, 224,225; *see* Agave americana.
——— one of the fibre-yielding plants of the West Indies, 109; *see* Agave sp.
——— Tree, 111; *see* Agave sp.
———, used as a famine food, 243; *see* Agave sp.
Maguey, wild, 225; *see* Agave americana.
Magueyes, an Indian tribe of Central America, 225.
———, farms and plantations in Mexico, 223.
——— (1), Indian tribe of Central America, 224, 225, 249.
——— (2), farms or plantations of maguey, 226, 227.
Magui, 223, 226; *see* Agave americana.
Maguie, 223; *see* Agave sp.
Magweiz, 226; *see* Agave sp.
Maktum, variety of Dates, in Mesopotamia, 16.
Malai, 227; *see* Agave Vera Cruz.
——— *Kathalai*, 226; *see* Agave Vera Cruz.
Malay, Kuttalay Nar., 226; *see* Agave vivipara.
Malino, 226; *see* Furcraea spp.
Mallahs, an inferior caste in Palamau who extract *kath*, 25.
Manchi Kalabanda, 226, 227, 235; *see* Agave Vera Cruz.
Mandala, 235; *see* Aloe vera.
Manfreda, 108, 193, 241; Agave sp.
Manfreda group of *Agaves*, 167.
Manguai, 226; *see* Agave spp.
Mangue, a civilised race of Central America, 225.
Manguei, 226; *see* Agave spp.
Mangurie, 226; *see* Aloe secunda.
Manila, 226; *see* Furcraea cubensis.
——— Aloe fibre, 159,226; *see* Agave vivipara.
——— Hemp, 159, 267; *see* Musa textilis.
Manjee, 235; *see* Agave sp.
Manjie, 226; *see* Agave sp.
Manjina Nar., 227; *see* Sansevieria Zeylanica.
——— *Naru*, 226; *see* Sansevieria Zeylanica.
Mansarami, a refined cutch, 35; *see* Acacia Catechu.
Ma-qui, 229; *see* Agave spp.
Maquey, 228; *see* Agave spp.
Marcgraf de Liebstad, G., 115, 116, 143, 185, 187, 239.
Marool, 228, 229; *see* Sansevieria Zeylanica.
Marsdenia, sp., 229.
———, tenacissima, 176, 177, 235, 253.
Martin, Montgomery, 24.
Martins, M. Charles, 111, 112.

Martius, C. F. P. von, 85, 86, 97, 108-110, 117, 129, 145, 146, 161, 169, 175, 177, 181-195, 199, 201, 205, 223, 225, 237, 243-247, 253, 259, 271.
Martyn, Thomas, 123, 124.
Martyr, Peter, 97, 109, 231, 243.
Marul, 229; *see* Sansevieria Zeylanica.
———, (1), 228; *see* Sansevieria Zeylanica.
——- (2), 228; *see* Agave Vera Cruz.
Mast, 228, 231, 247; *see* Agave spp.
Matamoras fibre, 233; *see* Agave heteracantha.
Matha, 217; *see* Agave spp.
Mat-making, 161; *see* Nannorhops Ritchieana.
Matta, 217; *see* Agave spp.
Mattioli, P. A., 112.
Mauritius hemp, 94, 95, 105, 131, 165, 175, 181, 185, 197, 201, 221, 228, 229, 245, 257; *see* Furcraea sp.
——————— fibre, Machine for scutching, 197.
——————— of S. India, 229.
Maurvi, 177, 228, 235; *see* Aletris sp.
Maya, 230; *see* Agaveae spp.
——-, 231; *see* Bromelia chrysantha.
Mayas, cultivators of Agave spp., 146.
———, a civilized nation of Mexico, 259.
Maypole, 230, 247; *see* Furcraea cubensis.
Mazrai, 161; *see* Nannorhops Ritchieana, 161.
Mehta, R. P., 56.
Melia Azedarach, 72.
Mellis, 231; *see* Agave sp.
——— *Cour*, 169, 231; *see* Agave vivipara.
——— *kyre*, 217, 221, 230; *see* Agave vivipara.
Mellore, 231; *see* Pandanus sp.
Melt, 231; *see* Agave sp.
Mescal, 207, 230, 233, 235; *see* Agave sp.
——— *de Maguey*, a spirit, 231.
———, distilled spirit, 247; *see* Agave sp.
——— or *Mexical*, a spirit made from certain Euagaves, 231.
——— or *tequila*, spirit obtained from Agave, 98.
Mesopotamia, estimated number of Date palm trees in, 3.
Metl, 108, 109, 112, 223; *see* Agave sp.
Metl, 230, 235, 249; *see* Agaveae spp., also Bromeliaceae.
——— (a generic term), 97, 98; *see* Agave sp.
——— *Cotli*, 230; *see* Agave sp.
——— *Coztli*, 193; *see* Agave sp.
——— lenissimum, 116, 117, 239; *see* Agave sisalana.
——— or Honey Tree, 110; *see* Agave sp.
——— or *Manguei*, 117; *see* Agave sp.
——— *Pitae* (Thread Agave), 249; *see* Agave sp.
——— Tree, 111; *see* Agave sp.
——— V. angustifolia=Nequametl, 143; *see* Agave sp.
Metroxylon sp., 253.
Mexcal, 98, *see* Agave sp.
——— *Metl*, 232; *see* Agave sp.
Mexical or *Mescal*, a spirit made from certain Euagaves, 231.
Mexican Aloe, 232, 261; *see* Agave spp.
——————— (1), 245; *see* Agave sp.
——— ——— fibre, 232; *see* Agave sp.
——————— fibre, 163, 183, 187, 195, 199, 207; *see* Agave spp.
——— ———, 232, 249; *see* Agave heteracantha.
——— ———, 239; *see* Agave sp., also Nidularium Karatas.
——— ——— (1), 179, 221, 232, 235; *see* Agave sp.
——— ——— (2), 232, 255; *see* Nidularium Karatas.
——— ——— Grass, 234; *see* Agave sisalana.
——— ——— Hemp, 234; *see* Agave sisalana.
——— ——— Whisk fibre, 179, 233, 234, 249, 265; *see* Epicampes macoura.
Mexico, date palm in, 2.
Mexocotl, 118, 234; *see* Bromelia sp.
Meyer, Ernst, 107.
Mezcal (1), 234; *see* Agave potatorum.
——— (2), 234; *see* Agave americana.
Miller, P., 86, 87, 89, 92, 99, 100, 103, 123, 124, 128, 131, 139, 140, 141, 142, 143, 147, 209, 259, 267.
Mimusops Elengi, 171.
Miquel, F. A. W., 54, 237.
Moarba, 229, 235; *see* Sansevieria Zeylanica.
Mogai khair, a grade of Cutch in Calcutta market, 35.
Mohideen Sheriff, 48.
Monakhir, variety of Dates, in Tunis, 16.

Moon, A., 131.
Moore, T., 89, 101, 225, 265.
Moorgalie, 177, 235; *see* Sansevieria Zeylanica.
Moorva, 221; *see* Celosia cristata.
———, 177; *see* Sansevieria Zeylanica.
Mordha, 234, 237; *see* Agave Vera Cruz.
Morison, R., 109.
Morisu-avarai, 57; *see* Psophocarpus tetragonolobus.
Morocco, estimated number of Date palm trees in, 3.
Morren, E., 205, 255, 257.
Morris, Sir D., 91, 193, 205, 257.
Morva, 177; *see* Sansevieria Zeylanica.
Motta, 217; *see* Agave spp.
——— *Munjee Nar.*, 227, 234, 235, 237; *see* Agave sp.
Mouroukouavarecody, 57; *see* Psophocarpus tetragonolobus.
Mozati, variety of Dates, in Baluchistan, 17.
Mubsali, variety of Dates, in Arabia, 17.
Mukerji, Babu T. N., 138.
Mulford, Miss, 81, 142, 207.
Munda, 219, 234; *see* Agave Wightii.
Munjee Nar, 234, 235; *see* Agave sp.
Munting, A., 117, 118, 122.
Muraga, 234, 237; *see* Aletris.
Murba, 235; *see* Sansevieria sp.
Murdasing, variety of Dates, in Persia, 17.
Murga, 177, 221; *see* Agave sp.
———, 235; *see* Aletris sp.
———, 237; *see* Agave americana.
———, 235; *see* Agave Vera Cruz.
——— (1), 236; *see* Agave americana.
——— (2), 236; *see* Agave Vera Cruz.
Murgabi, 235; *see* Sansevieria sp.
Murgahvee, 235; *see* Sansevieria sp.
Murgha, 237; *see* Agave spp.
Murukku avarai, 57; *see* Psophocarpus tetragonolobus.
Muruvu-dul, 177; *see* Sansevieria Zeylanica.
——— of Ceylon, 229; *see* Marsdenia sp.
———, 235; *see* Marsdenia tenacissima.
Murva, 229; *see* Sansevieria Zeylanica.
———, 235, 237; *see* Sansevieria sp.
Musa textilis, 158, 183, 186, 267.
Musa troglodytarum textoria, 182.
Musambra, 236, 237, 271; *see* Aloe sp.
Mutta Sagu, 236; *see* Agave Vera Cruz.
Mysore Aloes, 236; *see* Aloe sp.
———, 237; *see* Agave sp.

N

Naeldendraet, 127, 195; *see* Agave sp.
Nagal, variety of Dates, in Arabia, 17.
Nágas, a hill tribe of Assam, 69.
Nanas Boaya, 114, 169; *see* Agave Cantala.
———, (Crocodile pineapple) 221; *see* Agave Cantula.
———, 236; *see* Agave Cantala.
——— *costa*, 237; *see* Agave Rumphii.
——— *sabrang*, 169; *see* Ananas sativa.
——— *utan*, 114, 169, 209, 236; *see* Agave sp.
Nannas Sabrang, 236; *see* Agave Rumphii.
Nannorhops Ritchieana, 160, 238, 240, 266.
Nanut (pine apple?), 265; *see* Agave americana.
Napier, James, 40.
Nar, 211, 236; *see* Agave sp.
—— fibre, in South India, 193; *see* Agave sp.
———, 181; *see* Agave americana.
Nara, 219; *see* Agave Cantala.
Necker, N. J. de, 52.
Necklaces, religious, materials used in making, 69, 73.
Nelson, Mr. 265.
Nelumbium speciosum, 72.
Nequametl, 143; *see* Agave sp.
———, 187; *see* Furcraea gigantea and F. cubensis.
———, 237; *see* Agave and Dasylirion spp.
———, 239; *see* Furcraea cubensis.
———, (1), 236; *see* Furcraea tuberosa.
———, (2), 238, 263; *see* Furcraea cubensis.
Nequen, 201; *see* Agave sp.
Ngabo, 44; *see* Odina Wodier.
Nidularium Caratas, 93, 205, 206, 232, 243, 254.
——— Karatas, 205.
——— sp. 185.
Nipi, 238; *see* Agave americana.
Nita, 238; *see* Agave americana.
Nulkyitha, 238; *see* Agave Wightii.
Nyman, C. F., 126.

O

Obsidian, use of, in Mexico before discovery of metals, 271.
Ocimum basilicum, 73.
——— -- sanctum, 73, 74.
Ocpatli, 238; *see* Agave.
———, an herb used in Mexico for flavouring Agave cider, 98.
Octli, 238, 271; *see* Agave spp.
——, fermented liquor derived from Agave sp., 97, 239.
Odina Wodier, an adulterant of cutch, 44.
Offset, or sucker, 238, 261; *see* Agave sp.
"Offshoots" or "suckers," 2, 7; *see* Date palm.
Oil of Cochlospermum Gossypium, 66.
Orop, 19; *see* Costus speciosus.
Oroxylum indicum, 73.
Ortie blanche, 189; *see* Boehmeria nivea.
Otto, 98, 140, 225.
Oviedo y Valdes, Gonzalo Fernandez de, 109, 181, 189, 201, 203, 213, 225, 243.

P

Pagodite or pagoda-stone, rosary made of, 75.
Pakku, 48; *see* Areca Catechu.
Pa-lan-toung-Wae, 19; *see* Costus speciosus.
Palkande, 217, 238, 239; *see* Agave sp.
Pallam, 57; *see* Psophocarpus tetragonolobus.
Pallang, 57; *see* Psophocarpus tetragonolobus.
Palma, 195, 238; *see* Agave spp.
——— *bareta*, 239; *see* Agave and Yucca spp.
——— *loca*, 195; *see Palma*.
———————, 199; *see* Agave striata.
———————, 239; *see* Agave and Yucca spp.
Palma real, 239; *see* Agave and Yucca spp.
Palmae spp., 242.
Palmetto, 161; *see* Nannorhops Ritchieana, 161.
Palms, 243; *see* Agave sp.
Pán (betel leaf), 31.
—— preparation of an article nearly free from tannic acid, 46.
Panam Katrazhi, 238; *see* Agave americana.
Pancratium sp., 261.
Pandanus, 114, 169.
———————, 169; *see* Agave Cantala.
———————, 171; *see* Agave sp.
———————, 173; *see* Agave americana sp.
———————, 171; *see* Aloe sp.
——————— fascicularis, 219.
———————————, *syn.* P. odoratissimus, 36.
———————foetidus, 216, 217.
——————— Leram, 231.
——————— odoratissimus, 216, 262, 264.
——————— sp., 168, 170, 217, 221, 231, 263, 265.
——————— spp., 217.
Paper parchment from Agave leaves, 97, 109.
Papri khair, 24; *see* Acacia Catechu.
———————, 36; *see* Gambier.
———————, of Calcutta bazars, 46; *see* Uncaria Gamber.
———, light coloured catechu of Bengal, 24.
Parkand, 238, 239; *see* Agave americana.
Patha, 241.
———, 238; *see* Nannorhops Ritchieana.
Pati, 117; *see* Agave sp.
———, 197, 201, 213, 238; see Agave sisalana.
——, produced the finest fibre or tow, 98; *see* Metl and henequen.
Pattha, 161; *see* Nannorhops Ritchieana.
Pavon, J., 108, 124.
Pedda Kalabanda Nara, 240; *see* Agave vivipara.
Peemai, Kathalai, 240; *see* Agave sp.
Peetha Kalabanda, 240, 241, 245; *see* Agave Vera Cruz.
——— *Kalabantha* (1), 240; *see* Agave vivipara.
———————, (2), 240; *see* Agave americana.
——— *Kalabunda*, 245; *see* Agave sp.
Pe-gale, 60; *see* Psophocarpus tetragonolobus.
Pegu cutch, 34; *see* Acacia Catechu.
———————, 24; *see* Acacia Catechuoides.
—— *Khair*, a grade of cutch in Calcutta market, 35.

Pe-gyi, (Phaseolus lunatus) 60; *see* under Psophocarpus tetragonolobus.
Pei Kathalai, 240; *see* Agave Vera Cruz.
Pemm, 240; *see* Ceiba pentandra.
Pemmanaw, 240; *see* Aloe Yuccae foliis.
Pe-myit, 57, 63; *see* Psophocarpus tetragonolobus.
Penca, 240; *see* Agave sp.
Penguin, 213; *see* Ananas sylvestris.
———, 208; *see* Bromelia Penguin.
Penva, 19; *see* Costus speciosus.
Perkin, A. G., 45.
Perottet, J. B. A., 53.
Perrine, Dr. H., 135, 142-145, 189, 195, 203, 207, 253, 259.
Persia, estimated number of Date palm trees in, 3.
Pe-saung-sa, 57; *see* Psophocarpus tetragonolobus.
Pesh, 161, 239, 240, 267; *see* Nannorhops Ritchieana.
Petha Kalabantha, 240; *see* Agave americana.
Petre, 240; *see* Yucca gloriosa.
Phoenix dactylifera, 1.
——— sylvestris, 2.
Pierre, L., 54.
Piet, 165, 175, 243, 245; *see* Furcraea sp.
—— (1), 240; *see* Fourcroya foetida.
—— (2), 240; *see* Furcraea sp.
Pina, 243; *see* Agave and Furcraea spp.
——, 205; *see* Ananas sativa, 205.
——, pineapple, 205; *see* Ananas sativa.
Pineapple, 159, 169, 193, 215; *see* Ananas sativa.
———, 251; *see* Reda aonas.
———, Alligator Pineapple, 237; Foreign Pineapple, 175, 237; Wild Pineapple, 237, 243; *see* Agave spp.
———, cultivated, 169; *see* Ananas sativa.
Pinon, 242; *see* Agave or Furcraea spp.
Pinuella, 205, 242, 255; *see* Bromelia sylvestris.
———, 243; *see* Karatas Plumieri.
———, 205; *see* Pita Bromelia.
Piso, W., 115, 116, 181, 187.
Pit, 241; 242, 243; *see* Furcraea.
——, or *Pita*, 116; *see* Agave sp.
Pita, 163, 242, 243; *see* Agave americana.
——, 97, 98, 116, 117, 144, 145, 223, 231, 241-243, 245, 255; *see* Agave, Bromelia, Furcraea and Palmae spp.
Pita Bromelia, 205, 242, 255, 257, 259, 267; *see* Agave rigida *var.* sisalana.
———, 179; *see* Bromelia sylvestris.
—— *de corogo* (a Palm), 243; *see* Agave sp.
——— *Zapateros*, 229; 241, 242, 255; *see* Bromelia Karatas.
—— fibre, 244; *see* Agave mexicana.
—— flax, 244; *see* Agave mexicana.
—— floya, 244; *see* Furcraea gigantea.
—— Hemp, 244; *see* Yucca and Furcraea spp.
—— *Kalabantha*, 244; *see* Agave sp.
—— *pinuella*, 243; *see* Agave and other spp.
———, 207; *see* Bromelia sylvestris.
—— thread, 138; *see* Agave sp.
—— (tobacco pipe), 243; *see* Agave and Furcraea spp.
Pite, 201, 245; *see* Agave and Furcraea spp.
——, 175, 244; *see* Agave, Furcraea, and Tillandsia spp.
——, 213; *see* Agave sisalana.
——, 241; *see* Fourcroya foetida.
—— *d' Haiti*, 201, 229, 233, 244; *see* Furcraea sp., 201.
Piteira, 243, 244; *see* Agave americana.
Pitha, 243; *see Pita*.
—— *Kalabanda*, 244; *see* Agave vivipara.
—— *Kalabuntha*, 244; *see* Agave americana.
Pitta, 244; *see* Agave americana.
—— *Ahetz*, 177, 246; *see* Aloe Yuccae foliis.
Pitte, 246; *see* Agave foetida.
—— *Ahetz*, 169, 221; *see* Aloe Yuccae foliis.
Plante de cent anni, 240; *see* Agave americana.
Platearius, M., 107.
Plukenet, L., 95, 115, 119, 175.
Pois Carré or Square pea, 57; *see* Psophocarpus tetragonolobus.
Pole, 231, 246; *see* Agave spp.
Pole plant, 246; *see* Agaveae.
Polianthes tuberosa, 199.
Poling of Agave branches, 122.
———— in different countries, 80.
Polygona, 122; *see* Aloe americana.
Pooty mungem, 193, 246; *see* Aloe sp.

Pooty munjee, 247; *see* Hibiscus cannabina.
Powell, B. H. Baden-, 48, 61.
Pottery, *Some Instances of Vegetable Pottery*, 35.
Prain, Col. D., 23, 24, 56, 77, 88, 92, 103.
Prickly pear, 5.
Prochnyanthes, 167.
Proctor, Professor H. R., 40, 41, 44, 46.
——— on analyses of Gambier, 46.
Procumbens = vivipara, 132; *see* Agave vivipara.
Psophocarpus comorensis, 54.
——— longepedunculatus, 54; *see* P. tetragonolobus.
——— *var.*, micropterus, 54; *see* P. tetragonolobus.
——— Mabala, 54.
——— palmettorum, 53.
——— palustris, 51, 58.
——— tetragonolobus, 51.
——— analysis of roots and of seeds, 64.
——— in Manilla (Philippines), 53.
Pulco, 98, 247; *see* Pulque.
———, a wine said to have been made from Agave, 110.
Pulcre, 247; *see Pulque.*
Pulque, 223, 233, 235, 239, 246, 271; *see* Agave spp.
Pulque Agave, 246; *see* Agave mexicana.
——— 251; *see* Agave sp.
——— only in cultivation, 129.
——— Agaves, 223, 225; *see* Agave spp.
——— how prepared, 181; *see* Agave americana.
Pulque, native cider of Mexico, 161.
——— plants, 140; *see* Agave sp.
——— producing Agaves, 80.
———, the national beverage of Mexico, 98, 247.
Pulqueria, a shop for the sale of pulque, 247.
Purchas, S., 187, 201.
Putanjee mala, 73; *see* Putranjiva Roxburghii.
Putchuk, 21; *see* Costus speciosus.
Putranjiva Roxburghii, 73, 74.
Pyinkado, 44; *see* Xylia dolabriformis.
Pyinma, 44; *see* Lagerstroemia Flos-reginae.

Q

Quera, 221; *see* Agave sp.
Quercus spp., 187.
Quetzalychtli, 248; *see* Agave Wightii.
Queura, 231; *see* Pandanus and Agave spp.
Qui, 248, 249, 253; *see* Agaveae spp.
—— or *Quil*, 145; *see* Agave sp.
Quil, 249; *see* Agaveae spp.

R

Rachidi, variety of Dates, in Egypt, 17.
Raciborski, 64.
Railway Aloe, 163, 248, 249; *see* Agave Vera Cruz.
Rail Kattalai, 248; *see* Agave Vera Cruz.
Raiz, 249; *see* Epicampes macoura.
——— *de Zacaton*, 248, 251; *see* Epicampes macoura.
——— (roots), 249; *see* Epicampes macoura.
Rajsarpa sankinee, 75; *see* Snake.
Rakas, 179, 248; *see* Agave americana.
——— *patta*, 250; *see* Agave americana.
Rakashi Mattalu, 248, 249, 251; *see* Agave americana.
Rakasi Matta, 248; *see* Agave Vera Cruz.
——— *Mattalu*, 250; *see* Agave Vera Cruz.
Rakis pattah, 251; *see* Rakas patta.
Rakshasha, an evil demon, 249; *see Rakas.*
Rakshasha Bali, 250; *see* Agave Vera Cruz.
Rakta kanchan, 69; *see* Adenanthere pavonina.
Rakus, 171; *see* Agave americana.
Ram Bans, 250; *see* Agave Cantala.
——— wild bamboo, 251.
Rambanskeora, 171, 250; *see* Agave Cantala.
——— 132; *see* Agave lurida.
Ramkanta, 250; *see* Agave americana.
Ramie, 189; *see* Boehmeria nivea.
Ramli, variety of Dates, in Egypt, 17.
Rangoon cutch, 24; *see* Acacia Catechu.
Rangooni Khair, a grade of cutch in Calcutta market, 35.

Raspador, machine for scutching Agave leaves, 250, 251.
Rati seeds, 69; *see* Abrus precatorius.
Ranwolf, L., 199.
Ravana, 250; *see* Aloe perfoliata.
——— *Meshid*, 131; *see* Agave sp.
———, 250, 251; *see* Agave vivipara.
Ray, J., 112, 115, 116, 118, 122, 123.
Recchi, 271.
Red Catechu, 24; see Acacia Sundra.
—— Cockscomb, 221; *see* Celosia cristata.
—— wood, The, 69; *see* Adenanthera pavonina.
Reda aonas, 193, 209, 250; *see* Agave sp.
Rede (net), 251; *see* Reda aonss.
Reichenbach, H. G. L., 85.
Reju, 179, 207, 233, 249, 250; *see* Epicampes macoura.
Rhea, 189; *see* Boehmeria nivea.
Rheede tot Draakenstein, Hendrik Adrian van, 187.
Rhubarb stalks, resemblance of certain fresh cut Agave leaves to, 85, 88, 91.
Rice root, 249; *see* Epicampes macoura.
Richard, A., 53.
Ricinus communis, oil cake of, 8.
Ricketts, W. R., 103.
Riddle, Dr. G. D., 179.
Ridley, H. N., 20, 57, 265.
Roemer, J. J., 125.
Rose, J. N., 98, 140, 161, 173, 181, 199, 223, 233, 235, 263, 265.
Roxburgh, Dr. W., 23, 52, 53, 87, 92, 96, 100, 129-131, 133-136, 138, 139, 175, 177, 183, 189, 253, 257.
Royle, Dr. J. F., 96, 135, 167, 191.
Rudraksha, 71; *see* Elaeocarpus Ganitrus.
Ruiz and Pavon, 85, 108, 124.
—— L. H., 124, 171.
Rumphii, 135; *see* Agave Rumphii.
Rumpf, G. E., 19. 51, 52, 54, 57, 58, 88, 100, 114, 115, 122-125, 127, 130, 132, 133, 135, 136, 237.

S

Sabal, 161; *see* Palmettos of Florida.
Sabar, 187; *see* Aloe officinalis.
Sabare, 107; *see* Agave sp.
———, 107; *see* Aloe vera.
Sabarra, 253; *see* Aloe sp.
Sabbare, 252, 253, 255, 271; *see* Aloe maculata.
Sabila, 253; *see* Aloe officinalis.
Sabir, 253; *see* Aloe officinalis.
Sabr, 252, 253, 255, 271; *see* Aloe officinalis.
—— or *Sabir*, 159; *see* Acibar, also Aloe vera, 159.
Saccharum officinarum, 160; *see* Aguardiente spirit.
Sacci, 252; *see* Agave rigida *var.*, longifolia.
——, (*Sacqui*) 144, 145; *see* Agave sp.
——, 253; *see* Agave sisalana.
Saci, 253; *see Sacci*, also Agave sp.
Sacqui, 80, 144, 145, 253, 259; *see* Agave sp.
——— 145, 146; *see* Agave longifolia.
———, 260; *see* Agave rigida.
———, 181, 189, 252; *see* Agave sp.
Safford, W. E., 55.
Saganara, 177; *see* Agave, Marsdenia, and Sansevieria spp.
———, 187, 252; *see* Sansevieria sp.
——— *Matha*, 177; *see* Agave and Sansevieria spp.
———, 252, 253; *see* Agave Vera Cruz.
Sagi, 253; see Metroxylon sp.
—— *Mutta*, 237, 252, 253; *see* Agave americana.
Sago palm, 70; *see* Caryota urens.
———, Malay, 253; *see* Sansevieria Zeylanica.
Sal, 36; *see* Shorea robusta.
Salm-Dyck, 95, 125, 127, 128, 147.
Sálpatawala, 36, 44; *see* Shorea robusta.
Samadera indica, 73.
Samani, variety of Dates, in Egypt, 17.
Samato, 252; *see* Fourcroya Cantula.
Samba kattalai, 252; *see* Agave sp.
———, 255, 261; *see* Agave sp.
San, 253; *see* Crotalaria sp., also Hibiscus.
—— *ka Nar*, 175, 252, 253, 261; *see* Agave americana.
Sandals, 161; *see* Nannorhops Ritchieana.
Sankinee Rajsarpa, 75; *see* Snake.
Sansevieria cylindrica, 221.
——— lanuginosa, 176, 247.
———, sp., 77, 118, 158, 159, 219, 221, 229, 235, 237, 247, 252, 253, 265.

Sansevieria Zeylanica, 176, 177, 186, 188, 226, 228, 252.
Santals do not extract oil from Cochlospermum, 67.
Saparra, 252, 253, 255, 261, 271; *see* Sansevieria Zeylanica.
Saponin, presence in Agave leaves not confirmed, 80.
Satawa, 19, 20; *see* Costus speciosus.
Sauga, 187, 253; *see* Sansevieria Zeylanica.
——— Rope, 252; *see* Sansevieria Zeylanica.
Saugoo nara, 252; *see* Sansevieria Zeylanica.
Saugu, 177; *see* Agave, Marsdenia and Sansevieria spp.
Saunders, W. W., 127, 139, 140.
Saussurea Lappa, 21.
Sayer, variety of Dates, in Mesopotamia, 16.
Schiede, Dr., 100, 129.
Schott, Dr., 90, 143, 144, 189, 195, 209.
Schultes, J. A., 127, 140.
Schumann, K., 55.
Screw pine, 36; *see* Pandanus fascicularis.
———, 169; *see* Pandanus.
Scutching Mauritius Hemp fibre, Machine for, 197.
Seaside Aloe, 252, 259; *see* Aloe littoralis.
——— 199; *see* Furcraea cubensis.
Sebar, 253; *see* Aloe officinalis.
Seema Kathalai, 254; *see* Agave Wightii.
Seemai Kattalai, 253, 254, 255; *see* Agave sp.
Seemann, B., 129, 181, 243.
Seemay cattalay, 254, 257; *see* Fourcroya gigantea.
——— *Kuttalay*, 254; *see* Furcraea sp.
Seeppu Kattalai, 253, 254; *see* Agave Vera Cruz.
Sempervivum, 136; *see* Agave sempervivum.
———, true Aloe, 130.
———, 255; *see* Aloe and Agave sp.
———majus, 127; *see* Agave sp.
———, or Aloe vera, 114.
Sempreviva, 253, 254; *see* Agave americana.
Sequidillas, 57; *see* Psophocarpus tetragonolobus.
Serenoa, 161; *see* Palmettos of Florida.
Seringe, N. C., 52, 53.
Setawa, 19, 20; *see* Costus speciosus.
Senbbara, 253, 254, 257; *see* Agave americana, also Aloe sp.
Sex of flowers in Date palm, 2.
Sewi, variety of Dates, in Egypt, 16.
Sha-bya-Kyaung-mwe, or blue cutch, *see* Acacia Catechu, 32.
——*net*, or black cutch, 32; *see* Acacia Catechu.
——*-ni*, or red cutch, 32; *see* Acacia Catechu.
Shans grow Psophocarpus, 58, 59.
Shaw-wa, or yellow cutch, *see* Acacia Catechu, 32.
Sherard, J., 124.
Sheriff, Mohideen, 48.
"*Shoemaker's thread*, 243; *see* Bromelia Karatas.
Shorea robusta, 36.
Short Aloe, 191; *see* Agave americana.
———, 223; *see* Agave vivipara.
———, 199; *see* Furcraea cubensis.
——— aloes, 254; *see* Agave americana.
Sibir, 253; *see* Aloe officinalis.
Siki nut, 72; *see* Euonymus grandiflorus.
Silk cotton, 65; *see* Cochlospermum Gossypium, also Bombax malabaricum and Eriodendron anfractuosum.
— —, grass, 97; *see* Agave sp.
———, 156, 183, 187, 205, 207, 213, 229, 243, 257, 259; *see* Bromelia sp.
———, 233; *see* Nidularium Karatas.
——— (1), 189; *see* Nidularium Karatas.
——— (1) 189, 254; *see* Nidularium Karatas.
——— (2), 256; *see* Bromelia Sylvestris.
———(3), 256, 263; *see* Bromeliaceae and Agaveae.
——— (4), 227, 256, 263; *see* Furcraea cubensis.
——— of Honduras, 179; *see* Bromelia sylvestris.
Silk of grass, 197, 256; *see* Aloe Yuccae foliis.
Simai Kathalai, 256; *see* Furcraea gigantea.

Sime Kattalay, 256; *see* Fourcroya sp.
—— *Kattale*, 199, 256; *see* Agave vivipara.
Sirooghoo Kuttalay, 219, 256; *see* Aloe littoralis.
Sisal, 201, 221, 229; *see* Agave sisalana.
——, a port on the Yucatan coast, 256.
—— Agave, 143, 213; *see* Agave sisalana.
—— Engelmann's views on, 143.
—— Fuagave, 271; *see* Agave sisalana.
——, False, 78; *see* Agave decipiens.
—— grass, 156; *see* Agave sp.
—— Hemp, 171, 195, 258; *see* Agave longifolia and A. sisalana.
————, 99, 135, 139, 144, 145, 201, 203, 205, 209, 233, 235, 257, 269. *see* Agave sislana.
—— of India, 253; *see* Agave sisalana.
——, True, 89; *see* Agave sisalana.
————, 101, 135, 142, 143, 146, 209.
————, group of Euagave, 101; *see* Agave sisalana.
Skulls used in making religious necklaces, 73.
Slave, Mr. H., 32.
Sloane, Sir Hans, 116, 117, 124, 148, 187, 189, 197, 201, 203, 213, 227, 247, 265.
Sly, F. G., 55.
Small Aloe, 219, 253, 258, 259; *see* Aloe littoralis.
———— of India, 91; *see* Agave Wightii.
Smokva arapska, 260; *see* Agave americana, 260.
Snakes, vertebræ of, used in making religious necklaces, 73, 74.
Soap Agave, 260; *see* Agave Saponaria.
——, fine toilet, made from Yucca sp., 167.
——, marine and toilet, made from Agaves, 167.
—— producers, 159; *see* Yucca spp.
—— substitutes, Agave leaves and roots as, 97.
Sobolifera, 118; *see* Agave americana.
Sobr, 253; *see* Aloe officinalis.
Socotra Aloes, 253; *see* Aloe officinalis.
Sodursun, 173, 260; *see* Agave sp.
Sola, 70; *see* Aeschynomene aspera.
Sona, 73; *see* Oroxylum indicum.
Soodursun, 173; *see* Agave sp.
Sorghum sp., 179.
Sosqui, 253; *see* Agave sp.
Sosquil, 259; *see* Agave rigida, *var.* longifolia.
————, 145; *see* Agave sp.
Sotol, 260; *see* Dasylirion sp.
——, a spirit distilled from Dasylirion, 231.
——, an alcoholic beverage, 98; *see* Dasylirion.
——, distilled spirit, 247.
Spadu, 261; *see* Agave americana.
Spanish Aloe, 260; *see* Agave americana.
———— Barb (vegetable hair), 138; *see* Tillandsia.
———— Bayonet, 193, 260; *see* Yucca gloriosa.
———— Dagger, 193; *see* Yucca gloriosa.
———— Moss, 159; *see* Tillandsia sp.
Spata, 261; *see* Agave americana.
Spatola, 261; *see* Agave americana.
Spatona, 261; *see* Agave americana.
Spatone, 260; *see* Agave americana.
Speke, J. H., 54.
Spirit, 161; *see* Aguardiente.
Spon, E. and F. N., 93, 207, 221, 233, 255.
Spondias mangifera, 73.
Sprengel, K., 177.
Squier, E. G., 181, 225, 231, 255, 265.
"Squill, 171; *see* Aloe sp."
Standford's Compendium, 259.
Stephegyne diversifolia, leaves utilised for wrapping Cutch, 34.
Stewart, J. L., 20, 219.
Stones used in making religious necklaces, 73.
Stratiotes aloides, 116.
Sukhdarsan, 261; *see* Crinum sp.
Sultani, variety of Dates, in Egypt, 17.
Sun ka nar, 260; *see* Agave sp.
Suvaru, 260; *see* Agave sp.
———— *Kattali*, 260; *see* Agave Vera Cruz.
Swingle on the Date palm, 6.
Sydow, P., 64.

T

Tabago silk grass, 262; *see* Furcraea cubensis.
Taberzal, variety of Dates, in Mesopotamia, 17.
Tacori, 262; *see* Aloe Yuccae foliis.

Tafilet, variety of Dates, in Morocco, 16.
Tagoara fibre, 263; *see* Guadua Tagoara.
Tale, 263; *see* Pandanus sp.
—— *Nar*, 265; *see* Pandanus odoratissimus.
—— *naru*, 262; *see* Pandanus odoratissimus.
Tambir, Kostanacki, 45.
Tampico, principal port on the Gulf of Mexico as regards trade in Agave fibre, 262, 263.
Tampico fibre, 93, 98, 179, 191, 205, 207, 221, 233, 262, 263.
———— Hemp, 263; *see* Agave sp.
———— or *Lecheguilla* fibre, 99.
Tannic acid, a Catechu nearly free from, 46.
Tannin, 39; *see* Acacia Catechu.
———— in Indian Cutch, 40, 41, 50; *see* Acacia Catechu.
———— in pale cube gambier, 46; *see* Uncaria Gambir.
Tapemete, 262, 263; *see* Agave vivipara.
Tauk-kyan, 44; *see* Terminalia tomentosa.
Tawagas, 20; *see* Costus speciosus.
Tawa-tawa, 20; *see* Costus speciosus.
Tawe-tawe autar, 19; *see* Costus speciosus.
Tebu, 19; *see* Costus speciosus.
Tectona hamiltoniana, leaves employed for wrapping Cutch, 35.
Tecum, 265; *see* Aloe Yuccae foliis.
Teddala, variety of Dates, in Algeria, 16.
Teijsmann, J. E., 54.
Tela or *tele khair*, dark or black Cutch of Bengal, 35.
Temple, Chief Justice, 179, 257.
Tepemexcalli, 263; *see* Agave vivipara.
Tequila, 173, 203, 223, 225, 231, 233, 245, 249, 265; *see* Agave sp.
———— (1), 262; *see* Agave sp.
———— (2), 264; *see* Agave sp.
————, distilled spirit, 247; *see* Agave sp.
Terminalia bialata, an adulterant of Cutch, 44.
———— Chebula, an adulterant of Cutch, 44.
———— Oliveri, 32, 44.
————-————, an adulterant of Cutch, 44.
———— tomentosa, an adulterant of Cutch, 44.
Teysmann, J. E., 134.
Thalay Nar, 264; *see* Pandanus odoratissimus.
Than, 32, 44; *see* Terminalia Oliveri.
Thaulay Nar, 265; *see* Pandanus odoratissimus.
Thembu Nanut, 264; *see* Agave americana.
Theometel, 117; *see* Agave Theometel.
————, 122, 125, 127, 249, 264; *see* Agave sp.
Thompson, P., on Aloe brush fibre, 163.
Thorn apple, 239; *see* Datura Stramonium.
Thornton, 84.
"Thread, shoemaker's," 243; *see* Bromelia Karatas.
Thunberg, C. P., 131.
Ticu palm, 265; *see* Aloe Yuccae foliis.
Tillandsia, 183, 244.
———— recurvata, 158, 159.
———— usneoides, 172.
Tinder, the dried tissue of Agaves used as, 97.
Tjana-kua, 19; *see* Costus speciosus.
Tobago, 263; *see* Furcraea cubensis.
Toccon, 264; *see toucon*.
Tol, 175, 264; *see* Fourcroya cubensis.
Tornaboni, Bishop, 111.
Toucon, 264, 265; *see* Aloe Yuccae foliis.
Tournefort, J. P. de, 107, 116, 123.
Tow, short curled fibres from Agaveae, etc., 264.
Tranter, Dr., 171.
Trap-tree, 215, 264; *see* Artocarpus sp.
Trelease, Dr. W., 221.
Tripoli, estimated number of Date palm trees in, 3.
True Sisal, 89, 103; *see* Agave sisalana.
Tula, an upland tract in Mxico yielding Agave fibre, 263.
Tulsi, 73; *see* Ocimum sanctum.
Tunis, estimated number of Date palm trees in, 3.
Turkish Cymbals or Kettledrum, Zambur, 109.
Twine, binder, 175, *see* Agave fibre.

U

Ugyi, 32; *see* Acacia Catechu.
Umbar, 72; *see* Ficus glomerata.
Umber tree, 72; *see* Ficus glomerata.

Uncaria Gambir, 48.
Uromyces, 64; *see* Psophocarpus tetragonolobus.
Usteri, 55.
Utrasum bead tree, 71; *see* Elaeocarpus Ganitrus.
Utrasum beads, 72; *see* Elaeocarpus lanceolatus.

V

Valentyn, 114.
Venetian whisk, 179, 226; *see* Chrysopogon Gryllus.
Ventenat, E. P., 95, 193, 199, 201.
Vera Cruz Aloe, 123, 266; *see* Agave Vera Cruz.
—— Crucis, 130, 131, 139; *see* Agave Vera Crucis.
————, 139; *see* Agave sp.
Vieux, E. F., on materials used in making Bead Chains and Rosaries in India, 69.
Vinegar, 110; *see* Agave sp.
———— obtained from *Pulque*, 161.
Visiani, R. de, 107.
Voigt, J. O., 53, 88, 130, 131, 213.
Von Buch, L., 110.

W

Wahi, variety of Dates, in Egypt, 16.
Wallich, N., 52, 53, 130, 131, 136.
Warburg, O., 55.
Warth, Dr. H., experiments with Cutch, 33, 34.
Watson, W., 80, 134, 137.
Watt, Sir George, 55, 68, 96, 155, 221.
————————, on China grass, 189.
Welwitsch, F., 54.
'Whisk,' 251; *see* Andropogon sp.
Whisk, Mexican, 179, 233, 234, 249, 265; *see* Epicampes macroura.
Whisk, Venetian, 179, 226; *see* Chrysopogon Gryllus.
White fibre, 266; *see* Agave and Furcraea, also Bromeliaceae.
Wight Icones, 95.
———— R., 53, 92, 102, 122-140, 181, 213.
Wilayati ananas, 266; *see* Agave Cantala.
Wilayati Kantala, 266; *see* Agave americana.
Wild Aloe, 199; *see* Furcraea cubensis.
————, 239, 241, 266; *see* Nannorhops Ritchieana.
———— fibre, 266, *see* Agave sp.
—— Aloes, 266; *see* Agave sp.
—— Henequen, 195; *see* Agave sp.
—— Maguey, 225; *see* Agave Americana.
—— pineapple, 205; *see* Ananas sativa.
————————, 209; *see* Agave americana.
"————————," 237, 241; *see* Agave sp.
Willdenow, C. L., 86, 87, 123.
Wilson, Dr. H. H., 74.
————, T. C., 61.
Woodrow, Prof. G. M., 56, 63.
Woroninella Psophocarpi, 64; *see* Psophocarpus tetragonolobus.
Wyper, A. O., 92.

X

Xylia dolabriformis, an adulterant of Cutch, 44.

Y

Yacqui, 249; *see* Agave sisalana.
Yakkada Naru, paper fibre, 269.
Yanuga Calabunda fibre, 268; *see* Aloe perfoliata.
Yashki, 144; *see* Agave sp.
Yash-qui, 145, 146, 181, 189, 249, 253, 259, 268, 269; *see* Agave sisalana.
Yashqui henequin, 203; *see* Agave sisalana.
Yasqui, 145; *see* Agave sp.
Yaxche, 268; *see* Bombax ceiba.
Yaxci (*Yashki*), 144, 145; *see* Agave sp.
————, 268, 269; *see* Agave sisalana.
Yaxqui, 269; *see* Agave sisalana.
Yekka, 269; *see* Calotropis sp.
Yekkada, 269; *see* Calotropis sp.
———— *naru*, paper fibre, 269.
Yenuga Kalabanda, 195, 268; *see* Agave sp.
—— *Kalabonda*, 268; *see* Agave Vera Cruz.
—— *Kalamanda*, 268; *see* Agave sp.
Yercum, 269; *see* Calotropis sp.

Yercum (Calotropis), according to Roxburgh, the strongest fibre, 177.
Yerva, 197; *see* Sansevieria sp.
Yerva (Erva babosa), 197; *see* Aloes sp.
Yokada, 269; *see* Calotropis sp.
Yoshitake, 45.
Ystle, 268; *see* Agave Lechuguilla.
Yucatan Istle fibre, 259; *see* Agave Ixtli.
Yucay, 268, 269; *see* Aristolochia indica.
Yucca, 98.
——— acaulis, 222.
——— fibre, 163.
——— filamentosa, 158, 195, 202.
Yucca gloriosa, 158, 159, 162, 192, 196, 240, 269.
——— sp., 146, 159, 167, 172, 173, 215, 238, 239, 241, 244, 260, 265.
——— superba, 130.
Yuccada fibre, 268, 269.
———- *Naru*, 269; *see* Yucca gloriosa.
Yuccae, fibre-yielding, not yet sufficiently identified, 98.
Yuccas, 78, 82.
Yuccay, 268, 269; *see* Aristolochia indica.
"Ywe," or middle-men in Burma, 61.
Yxtli, 205, 207, 209; *see* Agave sp.
Yztli the mineral obsidian, 270.
—— 249; *see* Ixtli.

Z

Zabbara, 270, 271; *see* Agave americana.
———- *di ghai*, 270; *see* Agave americana.
Zabila, 253; *see* Aloe officinalis.
Zacatecas, an upland tract in Mexico yielding Agave fibre, 263.
Zaitun, 72; *see* Gyrocarpus Jacquini.
Zamarra, 270; *see* Agave americana.
Zambarone, 270; *see* Agave americana.
———- 271; *see* Aloe sp.
Zambur, Kettledrum or Turkish Cymbals, 109.
Zanbar, threads (of wool) 271; *see* Agave americana.
Zaparra, 270; *see* Agave americana.
Zaubar, 271; *see* Zanbar.
Zehedi, variety of Dates, in Mesopotamia, 17.
Zollinger, H., 134.
Zubbur, 270; *see* Agave americana.
Zuccagni, A., 118, 125, 126, 265.
Zuccarini, J. G., 86, 88, 93, 94, 97, 102, 132, 233.
Zugo de Cocoyza, 270; *see* Agave americana.

G. I. C. P. O.—No 158 R. E. P.—29-7-1907.—2,500—H. R.